

The Chemical Age

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Notes and Comments

As Others See Us

ELSEWHERE we publish a summary of the chapter on the chemical and allied industries in the London area in the latest volume of "A New Survey of London Life and Labour" which is being made under the auspices of the London School of Economics. While the point of view of the Survey is mainly that of labour, wages and working conditions, shrewd comments are made on technical development as compared with other industries, and a highly interesting and instructive picture of these industries as seen from an outside and impartial source is presented. London, in proportion to the relation of her population to that of the whole country, takes an important part in these industries, the total of her citizens employed in them being 26 per cent. of those so employed in Great Britain, whilst in paints, colours, etc., it is as high as 42 per cent., and has been increasing both relatively and absolutely during the last ten years.

Most of the sections are described as being in a prosperous state, and emphasis is laid on the fact that old-established family businesses constitute a large proportion of the whole. The Survey considers that some of the sections are still in a state of transition between pre-war rule-of-thumb industrial chemistry and modern scientific control, and that on the whole these industries have lagged behind other industries both in technique and in standards of working conditions. Here is further proof of our contention that there is plenty of work waiting to be done by our chemists, chemical engineers, consultants and plant makers in modernising these old factories and fitting them to compete on level terms under present day conditions, and we do not hesitate to repeat that now is the time to do this work, while materials are cheap and expert assistance is plentiful. Only courage is needed, and confidence that the improvement in trade already definitely noticeable in many directions is the beginning of a real and steady industrial recovery.

Registration of Chemists

THE British Association of Chemists in its official organ, the "Chemical Practitioner," again calls attention to this phase of the chemist's activities. In 1920 a committee of the Association investigated the subject and came to the conclusion that the title "chemist" could not be claimed as the sole property of those who practise the profession of chemistry and suggested the alternative title of "chemical practitioner." "What's in a name?" asked Shakespeare, and perhaps because

of the very eminence of the bard's name the answer that has generally been given is the same as his. But it is not altogether true that there is nothing in a name. People will listen to one who has "made a name for himself," while they will not heed another equally clever who happens to have blushed unseen. From that point of view the Association is wise to carve out a definite title for the chemist. The title "chemical practitioner," however, has never proved attractive and probably will fall gently into disuse, unwept and unhonoured. Most frequently, titles such as will appeal to the people at large do not come from conscious invention; they just "arrive"; the London public just now, for example, will have nothing to do with the "London Passenger Transport Board." That name, like that of "chemical practitioner," is too stilted. We prefer to say with Tennyson "Let be my name until I make my name."

Educating the Public

WE wonder whether the Association might not let the matter of a distinctive name rest, whilst possibly being careful to define the word chemist, whenever used, as excluding the dispenser of medicines. It is all a matter of educating the public; in our opinion the public is already becoming educated and its education would be completed much sooner if the popular press could first be persuaded to assist in the good work. Why should we not agree that there may co-exist several kinds of chemist. There is the man who discovers new chemical, new uses and new processes—the research chemist; there is the man who makes use of the research chemist's work and builds the plant—the chemical engineer; there is the man who uses both the first two in order to manufacture chemicals—the manufacturing chemist, industrial chemist, or process chemist; there is the man who ensures a supply of all these kinds of chemist—the teacher of chemistry; and there are the humbler folk who know perhaps but little of the inner knowledge of the vast subject but who are essential in order to pass on to the consumer a portion of the products of the manufacturing chemist—the salesmen. We feel that in that direction rather than in the invention of new titles lies the most commonsense way of procedure; in any event the public must be familiarised with the new term, whatever it may be.

This question of nomenclature is but a necessary prelude to the more important problem of registration. The effect of registration is said to be to solve the three problems of unity, legal status and economic

reward. The importance of unity is obvious to all; there are doubtless many subjects upon which a united body able to speak with the official voice of every practising chemist (or "chemical practitioner") in the country would be able to exert a wise influence both on behalf of the profession and for the well-being of the country. Whether registration is the only means by which this may be achieved we do not profess to know.

Restricting the Ranks of Chemists

IF registration is at present so difficult to accomplish we may well search for other means. Perhaps we may be pardoned for failing to see the necessity for establishing a legal status for the chemist. Each chemist has legal rights as an individual and those rights can be upheld, as now, by the aid of professional societies. The chemist has not a general relation with the public as have doctors of medicine and lawyers; he is simply an employee and we cannot quite see how a legal status for the profession as a whole will be any advantage. As we see it, the crux of the matter should be the reaction upon the industrial welfare of the nation of any action that is taken. We fail to see that an endeavour to restrict the ranks of chemists—engaged as they are in one of the most catholic of subjects—to those with certain qualifications would be of any particular advantage. If a manufacturer desires to employ people to perform chemical work who are not registered, that is entirely his own look-out.

Either registered or unregistered, the chemist will only be employed for so long as he performs an essential task satisfactorily and we shall be exceedingly surprised if Parliament could be persuaded to take any other view-point since at its roots the employment of chemists is so entirely a matter for the judgment and policy of the individual employer. The employer may be persuaded to give ample or even excessive economic reward to his chemists; we ourselves hold that the reward should be high enough to attract the best brains into the profession and to encourage those brains to devote their whole energies to the service of industry or of research; but the employer's will to give this economic reward is limited by his capacity to do so and this in turn depends, perhaps to a greater extent than in any other profession, upon the services rendered by the chemist himself. We should much like to hear the views of chemists and of the British Association of Chemists upon these questions.

The Position of the Consultant

THERE is a more solid ground for registration of the limited number of chemists and chemical engineers who wish to practise as consultants, and particularly those who accept premium pupils. The consulting chemist comes into direct contact with the public—as analyst, as adviser, as investigator of processes in which the public is asked to invest money, and so forth. It is of the utmost importance that all such men should be of the highest professional standing and integrity and should possess the knowledge they profess. By their contact with these men will the public judge the worth of the whole profession. The number who can earn a living by consulting work is limited; the ranks of those permitted to accept fees from the public or from others

should be limited. The competition which recognised consultants now endure from those who are also carrying on other businesses (such as teaching) should be stopped. All this could be achieved by compulsory registration as in the medical profession and by statutory limitation of the right to "consult" in particular industries.

Atmospheric Pollution

WE have always taken the attitude that the subject of smoke abatement is very much the concern of the chemical industry. The co-operation of our industry is necessary for the profitable disposal of liquid and gaseous products obtained from the manufacture of smokeless fuel; and, as shown in our editorial of September 23, the profitable elimination of sulphur from great volumes of the gases produced in power stations and boiler houses, is one of our immediate problems. If proper plans are to be made, and workable processes devised, to deal with the problems of the future, it is necessary that the chemical industry should have knowledge of what these problems are to be, so that in future the policy of our fuel interests must be carefully studied. At the fifth annual conference of the National Smoke Abatement Society, one of the principal speakers, Mrs. Jast, whose speech was almost too enthusiastically applauded by the president in his later pronouncement, after dealing with the evils of overcrowding, said: "No matter how grandiose the schemes of re-housing, no matter how far trams enabled workmen to be transplanted, so long as the burning of raw coal was permitted, so long would the evils of unnecessary labour and the creation of slum areas persist. Man wanted not only air but warmth. He had discovered a form of chemical combustion which gave that, and on the altar of his fire-worship he offered up himself as a living sacrifice."

The Architect and the Coal Advocate

IN any scheme of town planning and of rehousing the population with the elimination of the slums, the architect must play an important part. It is, therefore, of interest to record that the report just issued by the Coal Utilisation Council states that "The council's inquiries have shown the architectural profession to be solidly in favour of the open fire on the grounds of appearance, comfort and health." The council will further proceed to offer a prize for the most effective simple appliance for smoke abatement in domestic grates. The problem is likely to be complicated by the interposition of vested interests, and it would appear that the general solution, namely, the manufacture of millions of tons of solid smokeless fuel, about which we have heard so much recently and for the past 20 years, is not likely to be accepted by the coal industry. Nevertheless, unless the smoke consuming device finally adopted by the coal industry is simple and inexpensive we fear that it will have the same defect as previous coke and gas burning grates, in that it will only be acceptable to those who can afford to pay for it. Is the National Smoke Abatement Society in agreement with the architects as to the advantages of the open fire, and if not what qualifications do architects possess which enable them to make so definite a pronouncement on this controversial subject?

The British Association Meeting, 1933

Professor H. E. Armstrong's Impressions

THE meeting at Leicester has been in the spirit of the age. So far apart were the Section rooms that 1933 is expected to go down in history as the hiking and slimming year; notable figures are even reported to have diminished "wisibly" during the week, so much were their owners on their feet. Dress has been decent throughout, as perhaps nowhere else. Still, a danger period may well be in the offing, as the Association is billed to star at Blackpool in 1936. Rumour has it that there is a desire to see a Music Section established. Why not? Provided that one of its immediate functions shall be to prevent misuse of science, by ruling out the aural misery now forced upon society by B.B.C. and gramophone blatantly raucous, voice-distorting "loud speakers." The Section, of course, should include dancing and sun-bathing. A scientific body must be forearmed. Who knows: if the members do not meet in a swimming pool, watching their leaders make high dives instead of giving dull addresses, they may spend their time on the swings and roundabouts in bathing dress—or what then will pass as such, if any remain. At present, the moral standard of the Association is reported "high"; the intellectual is more open to question, too limited in outlook. A good many old B.A. clothes may well be cast away; at least half the Sections should be put into cold storage.

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The presidential addresses at the meeting are published together under the title "The Advancement of Science, 1933." They are a strangely incoherent medley, if not muddle of subjects, scarce one suited for public consumption or of any constructive value. Of what good is *Agriculture* at a meeting without farmers? The address, without a line of any appeal to the farmer, was a mere precis of the subjects now dealt with in an academic course of lectures: this at a period of the greatest crisis in agriculture the world has known, when the whole future of farming is at stake in our country. The Association—in particular its officers and its Council—clearly needs a course of *Adult Education*; counting botany among its subjects it might well have sought K. advice how to turn over a new leaf in the new century.

"Bah, bah, Black Sheep, have we any use for wool; if not, why not?" or some similar subject, might well have been discussed, now that we are no longer woolly, however wild the West remain now that we no longer hang it upon our clothes-line, its place being taken by a diaphanous wooden substitute. The farmer needs to know where advance in science is leading wool to-day; it cannot all be going into the heads of the promoters of B.A. joy-riding.

The Association has far too many Sections; interests that should be drawn together are pulled apart. The discourses are above the heads of all but a few of those who pretend to listen to them. Take the address in *Geology* on coal—clearly a highbrow (save the word) effort of the first order but jargon from beginning to end, which only the writer and perhaps half a dozen of his clan can understand. It should have been stopped at source by a secretarial refusal to pass it for press—what are secretaries paid (or unpaid) for to do? It will have had its use, however, if it lead to some notice being taken of the abuse of English at and by the Association. Again an opportunity was missed. Coal is so absolutely misrepresented owing to the vested interests of everyone who deals with it, that a clear impartial statement of the coal situation would have been of utmost value.

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Psychology was also a tangle of jargon but ever has been. So if we are to abolish jargon, we may with advantage get rid of J, until its votaries have learnt a little fundamental science and can speak with some knowledge of our human physico-chemical mechanism, as well as use the language of sane men.

The address in Section E (*Geography*) would be delightful as a magazine article and ought not to be buried in the Association volume. It helps not a jot to solve the knotty problem of schools: what time shall be spent—or wasted—upon the subject and how. It is one of the subjects that has been cleverly talked into a hearing of late years but it is not and never can be a science—because of its universality. All the world's its stage; to graph the geosphere is to tell everything of its nature and doings. Personally, I would sweep out all specific "sciences" from schools and teach, first, the use of hands, then languages, fundamental mathematics—and geography. Geography is being taught outside the schools—by travel, through the fruit shops, by the press, at the pictures, above all, through photography and the poster. Competition is the father of geography to-day. Take the posters issued by the Empire Marketing Board and the railways—they are marvellous in their beauty and fidelity of representation. As I showed, at my benzene stall, at the Faraday Centenary Exhibition at the Albert Hall, it is now possible to study geology from the railway platform, while waiting for the train, even on the Underground; the only drawback is the ultra rapidity of the service: if half-hour intervals were frequent between trains, people would come to appreciate the perfection of the posters and really learn from them. Questions might even arise, such as "Why does Guinness alone among what pass as—beers carry a head?" What the school has to teach is the right use of the opportunities now everywhere at hand calling for the intelligent use of eyes and of 'eds too.

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Those who have eyes to see must glory in pictures such as that of the Empire Marketing Board showing Indian tea gardens with the stupendous range of the Himalayan mountains in the background. Most remarkable is the Southern Railway poster just out of the great chalk gorge, the near eastern end of our English Channel; to make it perfect, as a lesson, it should carry at its head the caption from Huxley's lecture "on a Piece of Chalk":—

"A great chapter of the history of the world is written in the chalk. Few passages in the history of man can be supported by such an overwhelming mass of direct and indirect evidence . . . few chapters of human history have a more profound significance for ourselves. . . . the man who should know the true history of the bit of chalk which every carpenter carries about in his breeches pocket, though ignorant of all other history, is likely, if he will think his knowledge out to its ultimate results, to have a truer and therefore better conception of this wonderful universe and of man's relation to it than the most learned student who is deep-read in the records of humanity and ignorant of those of Nature."

With this addition, I suggest it should be hung in all Lyons' corner houses and tea shops—then adult culture would begin.

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Had Lord Meston but ventured down to the railway platform and made the delights of the poster the subject of his discourse, he would have gone down to posterity as the first to put his Section upon a public platform. Art is to the fore, all the time, when it is the art of Nature, not Cubism in concrete and steel. We are beginning to live in a world of colour and form! there is some chance of *Artistry* coming into our dull *Science*—dull only because it is made so by its votaries. Already this year, in the *Chemistry* Section, an advance was made by substituting a "tup'penny coloured version" of the address for the "penny-plain" one in the printed volume. The opportunity was there to go much further and entrance the whole Association. The love of flowers is universal yet flower colour passes unknown. Acting the Humming Bird Hawk Moth, the president might have buzzed airily over flower after flower, discoursing on its chromatic charms and the wonderful ways in which Nature builds to obtain her rainbow effects—a book thus far wilfully sealed by the schools.

"Oh, Tiger Lily," said Alice, "I wish you would talk."

"We can talk," said the Tiger Lily, "when there's anybody worth talking to."

"And can *all* the flowers talk?" said Alice.

"As well as you can," said the Tiger Lily, "and a great deal louder."

The noise of the outside world thus far has been too great for us to hear their talk. What are Robinsons at the B.A. for, except to get through the noise and be heard in the streets above motor horns.

Botany also was in no way O.K. in the list of subjects. Its votaries seem to have lost all sense of proportion and to have little concern with the plant—least of all as a food material to be unaware that they belong to agriculture. The two sections should be made into one, if only to prevent M from joining up with mathematics in A and pedagogy in 'ell. As yet we have no college in the country worth calling a College of Agriculture.

Having time to waste, while waiting for the train to town, we happened into the theatre close to the station, where 'ell was in conclave, engaged in a Symposium on the cultural value of science in adult education. A number of obviously learned men were seated in a row upon the stage—in themselves a variety show. After a Gregorian chant, of which we heard only the close, came a professor who expounded the charms of geology and geography with true pedagogicunction. No doubt his academic high kicks were well meant, as were those of subsequent performers. Unfortunately, none seemed to have the culture needed for the occasion. Obviously, they had not read the classic chapter on "Wool and Water," in which Alice and the Sheep discuss the price of eggs—also overlooked by Sir Josiah Stamp in his evening lecture. "Five pence farthing for one, twopence for two," is a perfect summary of the world situation to-day, which might well have been taken as the theme of the address in *Economics*. "I never put things into people's hands," said the Sheep—"that would never do, you must get it for yourself." Had the professor planked the Southern

Railway poster upon the wall and just said—"That's *Geology*, go there and get it," he would have set a pace for adult education and brought down the house, instead of provoking solemn silence. He need have said no more and other speakers would have been unnecessary, except to say ditto, as all the sciences are needed to decipher the meaning and measure of chalk. I suggest for consideration, that culture might be given by prize cards in cigarette packets.

B.A. meetings are but pleasant outings, affording opportunities for workers to fraternise, particularly in seasons of such wondrous weather as that we have enjoyed this year. Each of a number of more or less prominent actors in the great play of scientific endeavour has the chance, from his own dunghill, of lustily crowing his ware before a select circle of admirers. The camp followers flock to admire; to their credit be it said, they do not yet worry for signatures and are not known to collect photographs of their pet professors; perhaps some do in secrecy as so many are ladies. Who knows? Given over as the age is to collection of cigarette cards, the appeal of science is probably small. The meetings are "much of a muchness" with the banquets and dinner parties inseparable from charitable and commercial appeals and the party meetings of politicians. Being artists, scientific workers equally crave for the sauce of publicity and applause; being human, they openly enjoy putting in their thumbs, etc., in such a way that all who run after them, even those who stay at home and read, may say—"What good boys are they." The world lives by advertisement to-day and laboratory workers have been particularly overcome by the mania of late years. Together with the rise in the canning industry runs the art they are developing of sending their fruit to market long before it is ripe, so that an unfortunately low moral standard is being established, by the extension of the civil war of competitive commerce into the camp of science.

(To be continued.)

Chemical Industry in the London Area

By J. H. WEST, M.I.Chem.E.

MANY interesting facts and figures relating to the present development of the chemical and allied industries in the London area, and the changes that have occurred during the last twelve years, are given in Vol. V. of "The New Survey of London Life and Labour" recently published. The area covered by the Survey follows mainly the administrative County of London with a small salient beyond this on the north-west and a much larger salient on the east extending to about 12 miles from Charing Cross.

The industries dealt with are divided into ten groups:—Heavy chemicals; fine chemicals; drugs and essences; paints, colours, varnishes and dyestuffs; soap, perfumery and candles; oil seeds, bone meal and glue; oil and motor spirit refining and blending; matches; gas mantles; ammunition making; and miscellaneous. The aspects of the industries mainly dealt with by the survey, as its title indicates, are the type of labour employed, rates of wages, degree of organisation among employees and employers, working conditions, and amenities and welfare services provided by the employers, yet these data throw a good deal of light on the technical development of the industries.

In a preliminary section it is pointed out that most of the labour is unskilled, the necessary knowledge and skill being provided by the chemists, foremen and charge hands. Process work does not lend itself to payment by piecework, but some firms employ piecework in connection with boxing, bottling and packing. The great majority of workers are given one week's summer holiday on full pay. The level of unemployment is lower than the average rate for all the industries of Greater London. Between 1924 and 1930 the percentage of insured unemployed fell from 7.8 per cent. in 1924 to 3 per cent. in 1929, but rose again to 8.3 per cent. in 1931.

London produces 10 per cent. of the national output of heavy acids. As regards alkalies the only work done in the area is the manufacture of a certain quantity of caustic soda by soap makers for their own use, and the preparation of washing soda crystals from soda ash for the local market, thereby saving freight from the north on the water of crystallisation.

Referring to acid plants the Report says:—"In the older plants, where the kilns and vats are tended by hand, the work is fairly heavy, very dirty, and, at the kilns, hot. The air is full of acid fumes, the sheds are ill-ventilated and at the same time draughty . . . in some works there is a general air of untidiness which combines with the proximity of extensive dumps of fuming spent materials to produce a cheerless atmosphere."

Such works are described as "an anachronism from the point of view of efficiency and human welfare," but it is pointed out that they are already in a minority, and that in the modernised works, where mechanical stoking and handling of materials are used, and the plant is designed to prevent loss of heat and gases, the conditions are much better, but "canteens are very primitive or non-existent, and no attempt at welfare work is made." The present position is summed up as follows:—"The heavy chemical industry, as represented in the survey area, is in transition between the rule-of-thumb stage, which may be said to be characteristic of pre-war industrial chemistry, and the scientific stage which has become well established since the war." It is stated that many of these businesses are old family ones with close personal touch between the employers and the workpeople, and that many old plants are being re-conditioned or re-built, thus providing clean and healthy working conditions, but at the same time displacing a certain amount of unskilled labour.

The section relating to fine chemicals, drugs and essences is notable for two peculiarities, that an enormous number of different raw materials and products are handled in comparatively small quantities, and that the proportion of female labour is exceptionally high. In 1921 in Greater London 5,650 males and 5,140 females were employed in making fine chemicals and drugs, and about another 1,500 hands in essence distilling. The latter branch, which is said to be a predominantly London industry, consists of a few old family businesses, some of the larger of which are beginning to modernise their factories. A better class of labour is employed, care and reliability being required in many operations, though not much skill.

Paints, Colours, Varnishes and Dyestuffs

This is one of the most important sections in the London area, comprising half a dozen large firms and about fifty small ones, and the number of persons employed in it was 62 per cent. greater in 1931 than in 1923. The various operations involved in paint making are described, and it is pointed out that, while the rate of expansion is slow for ordinary paints, it is very rapid in connection with cellulose enamels and lacquers. The great decrease in the use of poisonous materials in paint making during recent years is alluded to, and the stringent Government regulations applied in the case of those which are still used are said to be effective in preventing industrial diseases. Instances of bad working conditions in some of the older factories which ought to be remedied are mentioned.

London does not make ordinary dyestuffs for textiles, but has a flourishing speciality trade in colouring matters for foodstuffs, toilet preparations, leather, printers' inks, and so forth. Some of the curious specialities are: "Kipper brown," "Butter colour fast to light and acid," "Rusk pink," "Sausage scarlet," a colour for imparting "a beautiful golden yellow to fish fillets," and a "Special blue for hair rinse."

This branch again consists mainly of old-established family businesses, and is in a flourishing condition, but the following significant comment is added, "They can probably look forward to steady business, provided that they can hold their own against the combination, but only if they give energetic attention to new and specialised lines."

In the soap branch attention is called to the steady reduction in working hours. Before 1911, 60 hours a week were worked. In that year this figure was reduced to 56½, to 54 in 1916, and to 48 in 1918, while some firms now only work 44 hours a week.

The perfumery trade is carried on mainly by old family businesses employing 100 to 500 hands, mainly women and girls of superior class and earning very good wages. Good working conditions and welfare activities are provided, and the industry is prosperous, catering for many requirements from lipsticks for the modern girl to "scented oils for smearing on the bodies of primitive peoples."

As regards candles it is stated that there has been little change in the methods of manufacture during the last fifty years. That this branch is by no means dying out, as might perhaps have been expected, is shown by the fact that the output of candles, night lights and tapers in Great Britain in 1930 exceeded 40,000 tons.

In the remaining sections there are only a few items of particular interest. The match trade works a 40-hour week with no work on Saturdays, and provides excellent welfare services. The manufacture of gas mantles, carried on in some half-dozen larger factories and a few smaller ones, is described as a predominantly London industry. Ninety per cent. of the employees are girls, who are of a good class and enjoy excellent conditions of work.

Conclusions

After pointing out that the introduction of special factory legislation relating to the chemical industry only took place half a century after similar legislation for the textile and other manipulative industries, due probably to the small proportion of female labour used in chemical work, the report says: "There has been a failure to keep pace with the progressively enlightened and exacting conditions of the times, and there is still a lag in both technique and standards of working conditions behind those of the manipulative industries."

The following table shows the number of persons employed in various sections of the industry in Greater London in 1923, 1927 and 1931 respectively. The figures in brackets show the percentages of the corresponding figures for Great Britain as a whole represented by the London figures.

	1923.	1927.	1931.
Chemicals ..	25,000 (24%)	22,640 (24%)	21,980 (22%)
Explosives ..	3,850 (20%)	3,230 (17%)	2,200 (13%)
Paints, colours, etc.	5,440 (40%)	7,960 (43%)	8,560 (42%)
Oils, soaps, matches, inks ..	17,780 (23%)	21,390 (27%)	22,690 (29%)
Totals ..	52,070 (24%)	55,220 (26%)	55,430 (26%)

The Chemists' Exhibition

New Developments in Bottles and Bottle Caps

THE 42nd Chemists' Exhibition, organised by "The British and Colonial Pharmacist," was in progress this week at the new hall of the Royal Horticultural Society, Westminster, where nearly one hundred firms engaged in the manufacture or packing of pharmaceutical preparations and sundries were exhibiting.

William Gardner & Sons (Gloucester), Ltd., were showing a number of machines of special interest to manufacturing chemists, including their patent "Rapid" sifters and mixers, patent spraying plant, and drying and grinding machinery.

Glass bottles in great variety were displayed by United Glass Bottle Manufacturers, Ltd., and by the International Bottle Co., Ltd. The "washed and sterilised ready-to-use medical bottle service" of the former firm is reported to be increasing in sale steadily, month-by-month, since its inception some four years ago, proving that the manufacturer's advertised claims have been lived up to and the stamp of approval has been placed by the profession on this service which bids fair to eventually oust the ordinary unwashed bottle for dispensing. The growing use of the screw cap in place of the old-fashioned cork was also demonstrated in this exhibit. A new glass-colouring process was shown giving permanent colours imparted to the surface of the glass in both translucent and opaque colouring.

Corn Products Co., Ltd., were exhibiting pure medicinal

powdered glucose of the finest quality, which is claimed to be identical with the sugar of the blood and tissues, and requires no digestion. Liquid glucose B.P., a mixture of dextrose, dextrin, and water, was also shown.

The Viscose Development Co., Ltd., the originators of self-fixing bottle caps, made a special display of "Viskaps" and "Viskrings," which are claimed to be the most up-to-date and efficient form of closure for every kind of bottle, flask, etc. These goods are made in various finishes, and in a large range of colours, and may be printed as required.

The Armstrong Cork Co., Ltd., who were exhibiting corks, have been in this line of manufacture for over seventy years, and work to defined standards of quality. Each size has a number and each grade a title; the sizes, moreover, do not vary and the grades remain consistent, and can be repeated at all times. Since the introduction last year of the Armstrong range of Armold caps manufactured in this country, the demand for this type of closure has increased to such an extent that a great many new moulds have been put into production. Among the exhibits of Howards & Sons, Ltd., was standard ether for producing anaesthesia, now made from pure spirit, duty free, without increase in price. Howards' Avantine brand of iso-propyl alcohol, a perfect substitute for S.P.R. in the manufacture of essences and perfumes, and for many other purposes, but very much cheaper, was also shown.

Recent Advances in Water Purification and Filtration

By W. J. M. COOK

(Research Department, Neckar Water Softener Co., Ltd.)

AN achievement in the field of water treatment, the far-reaching importance of which was made all the more apparent during the recent water shortage, is that of the Neckar Water Softener Co., Ltd. A problem involving research, both in the laboratory and on actual plant, has been successfully overcome and pond water, normally highly contaminated with bacteria and other biological impurities and coloured due to the presence of chlorophyll, has been made entirely potable and fit for use in the canning of vegetables. Pond water was available, actually the property of the canners, in a field adjacent to the factory. The only alternatives were, either to sink a well or to use the mains supply at a cost of 1s. 6d. per 1,000 gal. The latter, in addition to

and (3) filtration through sand. The results, substantiated by regular check analyses, copies of which are given below, were fully in accord with expectations and the final cost of treatment amounted to approximately 5½d. per 1,000 gal.

Results in parts per 100,000.

	Crude (1)	Treated (1)	Crude (2)	Treated (2)
Total solids ..	82.40	72.40	86.00	80.00
Chlorine ..	7.45	7.10	8.52	7.45
Nitric nitrogen ..	0.10	0.10	0.10	0.10
Free ammonia ..	0.005	Absent	0.012	0.012
Albuminoid ammonia	0.064	0.037	0.072	0.042
Aluminium sulphate	—	Absent	—	—
Total number of micro-organisms per c.c. growing on gelatin at 21°C. in 48 hours ..	420	19	1,120	179
Total number of micro-organisms per c.c. growing on agar at 37°C. in 48 hours ..	208	16	860	109

The average of the hardness results from five analyses showed the crude water to be 33°, while the treated water was 6.8° British, this being the desired condition for the process.

Addition of Lime

The use of saturated lime-water has been found to be by far the most positive form of dosing with lime. Using this form of lime addition, no mechanical agitation is required and, irrespective of the quality of the lime, a constant saturation is obtained at all times provided sufficient lime is added. By this method it is assured that the full properties of the lime are utilised. The new Neckar closed type saturator (Fig. 1) admits of charging at ground level. During charging all valves are closed; the necessary quantity of lime, calculated from the analysis of the crude water, is introduced into the lime tank and mixed to a "milk" with cold water. Valves 3 and 4 are now opened and the spent lime or sludge from the previous charge passes to drain. At the same time,

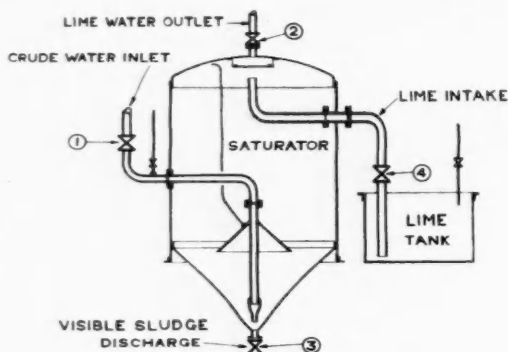


Fig. 1. Neckar Closed Type Saturator

its extreme hardness, was entirely inadequate for the demand. The pond water was also very hard, being approximately 31° total, of which 15° were temporary. Treatment was essential to reduce the hardness, but care had to be taken that the treatment did not affect the process. A further precaution had to be observed—that the softened water did not contain excess alkali, otherwise the lacquer, which covers the inside of the cans, would be affected.

Chemical Treatment Cycle

After laboratory experiments, in which vegetables were actually canned in strict accordance with the canners' formula, the lime-soda method of treatment was decided upon. It was stressed by the laboratory, however, that the most accurate form of chemical dosing gear should be employed to avoid any possibility of excessively alkaline water entering the system. The treatment was not yet complete, however; the lime-soda reduced the hardness to the desired figure besides decreasing the amount of colour and organic matter in the water. Further treatment was necessary to complete the removal of the colouring matter which precipitated upon heating; and, after further laboratory experiments followed by tests upon the plant, the use of aluminium sulphate as a coagulant was adopted.

The addition of aluminium sulphate to a water containing the bicarbonates of calcium and magnesium, known as the temporary hardness, results in the formation of a flocculent precipitate of aluminium hydroxide, conversion of the calcium and magnesium to sulphates and production of carbon dioxide. The hydroxide floc coalesces, carrying down with it mechanically the fine particles in suspension and removing much dissolved organic matter, which may impart colour to the water. In addition, it considerably reduces the number of micro-organisms which may be present, and, when followed by filtration through sand, results in a clear water, practically, if not entirely, free from any colour which the crude water may contain and with a greatly reduced bacterial content. The treatment cycle thus became, (1) coagulation with aluminium sulphate, (2) softening with lime and soda-ash,

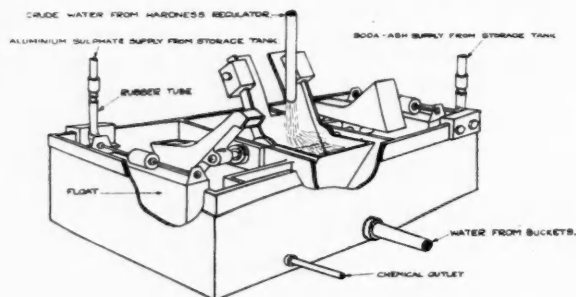


Fig. 2. The Chemical Distributor.

the new charge is syphoned into the plant saturating the water and settling into the cone. Valves 3 and 4 are then closed and the saturator is ready for service.

The Chemical Distributor

The chemical distributor (Fig. 2) works in conjunction with the Neckar water distributor or the Neckar patent hardness regulator, and delivers soda-ash solution and aluminium sulphate solution in the required amounts and *pro rata* to the rate of flow of water through the plant. It consists of a rectangular tank subdivided into three compartments, one of which is lead-lined if aluminium sulphate is the coagulant employed. In the centre compartment are two buckets free to oscillate on a spindle which also extends across the division on either side, and to which are attached two scoops, one in each section. These sections contain the soda-ash and coagu-

lant solutions, fed from nearby storage tanks, a constant level being maintained by means of a float in order that the scoops shall always be immersed. A stream of water from the water distributor or from the hardness regulator, whichever is installed, fills each of the buckets in the middle compartment alternately. The weight of a full bucket destroying the balance and causing it to tip and empty its contents whilst the second bucket is brought under the stream of water and filled. Thus, as the buckets tip, one scoopful of chemical is delivered to a small compartment in the chemical reservoir, sectioned off from the bulk of the solution. The scoops are so arranged that, with the tip of one bucket, soda-ash solution is delivered, whilst, with the tip of the other bucket, aluminium sulphate is delivered. From the chemical distributor, the solutions are conveyed to the respective reaction tanks to meet the bulk of the crude water; the water emptied from the buckets at each tip also joins the crude water stream.

The Sand Filters

The sand filter may be either a gravity or pressure type, according to requirements and site conditions; Fig. 3 shows a typical Neckar pressure filter. This type of filter has the advantage over the gravity type in that it can be installed in the pressure main. The container is a riveted, cylindrical tank with dished ends and is designed and constructed to withstand a pressure of 100 lb. per sq. in. Specially treated fine sand, resting upon graded quartz chippings, comprises the filtering medium, whilst a bed of concrete fills the bottom of the cylinder. Situated midway in the first layer of quartz is a pipe manifold so constructed as to ensure an even withdrawal of water through the bed when the filter is in service, thus avoiding "channelling," and a uniform distribution of water and air when the filter is being backwashed, thereby ensuring efficient cleansing. The numerous holes in each lateral of the manifold are fitted with special wire-gauze strainers which further preclude the possibility of sand being drawn through the treated water outlet. Cleansing facilities include provision for compressed air, a steam inlet and ejector being provided in case compressed air is not available. Pressure gauges are installed at the inlet and outlet of the filter to indicate when cleansing is required.

The unfiltered water enters at the point shown, gently overflows from the bell-mouth pipe, permeates downwards through the sand and quartz to be collected by the numerous strainers and is delivered perfectly free from all suspended matter. This continues until the interstices between the grains of sand have become partly choked with the arrested solid matter, when the pressure drop through the bed increases and indicates that the filter requires cleansing. Cleansing is done by passing air through the bed and reversing the flow of water; this is the process of backwashing. The compressed air lifts the bed, which tends to pack due to the continual flow of water downwards, at the same time agitating the sand and loosening the trapped impurities. The wash water which follows the air, floats these solid particles to the top of the filter, whence it passes, via the bell-mouth pipe, to the drain.

The Coagulating Tank

The main reaction tank in which the softening takes place has a vertical, cylindrical body with a conical bottom into which the precipitates settle to be removed by periodic opening of a sluice-valve. The tank in which the aluminium sulphate reacts with the temporary hardness of the crude water, known as the coagulating tank, is almost identical in design to the closed type saturator (Fig. 1).

The hardness regulator, by means of which adjustment can be made to counter variations in the hardness of the crude water, chemical distributor and chemical storage tanks are erected on the top of the main reaction tank. The pond water enters the hardness regulator, the pointer of which is set to the calibration corresponding to the temporary hardness of the water. Inside the regulator the incoming water is divided into three streams irrespective of rate of flow. One passes to the saturator, displacing an equivalent quantity of saturated lime-water; the second is led to the chemical distributor and brings about the addition of soda-ash and aluminium sulphate in the manner already described; the third, and bulk of the water, is led to the coagulating tank and enters at the side where it meets the aluminium sulphate

delivered from the chemical distributor. The water emptied from the buckets also joins the crude water stream prior to its entering the coagulating tank.

The aluminium hydroxide precipitate carries down the organic impurities, and settles into the conical bottom of the coagulating tank where it is eventually discharged by opening a sluice-valve. The water then rises in the tank, through the pipe in the centre of the domed top and thence to the mixing tube of the main reaction tank, where it meets the correctly apportioned quantity of soda-ash solution and the lime-water displaced from the saturator. The mixing tube is situated in the centre, and is approximately one-fifth of the diameter of the reaction tank. In this tube intimate mixing occurs, due to the confined space and the velocity of the incoming water and reagents. The precipitates formed gradually settle into the cone of the reaction tank and are removed in the manner already described. The softened water now rises around the outside of the mixing tube, gradu-

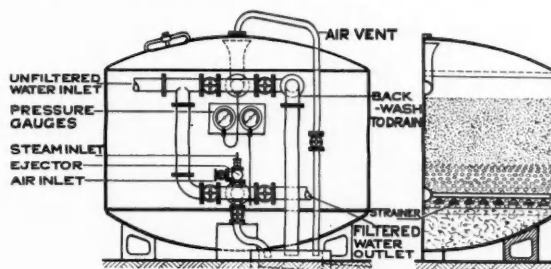


Fig. 3. Neckar Pressure Type Sand Filter.

ally becoming clearer as it reaches the top of the reaction tank where it passes through a preliminary filter composed of wood-shavings, known as wood-wool. The water then leaves the softener, passes through the sand filter and finally enters the storage tank.

Treatment by Chlorination

Where bacterial and organic contamination is not abnormal, the water is treated with gaseous chlorine followed by filtration through sand, and Neckar plants of this type are in operation treating river water and other supplies for various processes requiring sterile water. In some cases coagulation precedes chlorination, whilst in the case of swimming bath water, coagulation, filtration, chlorination and aeration are incorporated, the water in the bath being continuously removed and replaced by clear, sterile, aerated water. Filtration is also involved in a very large installation recently supplied to the Dartford Paper Mills, Ltd. Here water obtained from wells on the site is softened and conditioned for use in boilers operating at the high pressure of 485 lb. per sq. in.

Treatment of water for boilers working at such high pressure demands special care and attention and should appeal to the chemist as much as to the engineer. The water is first treated with lime, which removes the greater part of the temporary hardness, and then passes through sand filters of the pressure type. From the sand filters the water is passed through Neckar natural zeolite softeners which remove the remaining hardness so that a water of zero hardness enters the hot-well. The water after treatment with lime has a slight caustic alkalinity which has to be neutralised before it reaches the zeolite. This is done by adding dilute sulphuric acid solution to the water as it leaves the reaction tank, a specially designed apportioning apparatus being employed for this purpose.

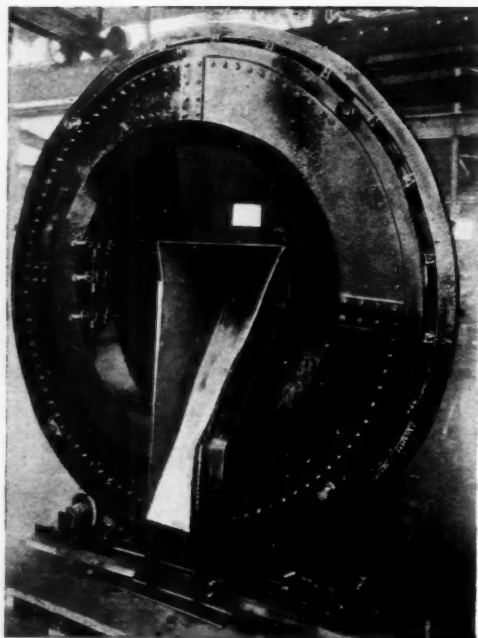
In conclusion, it may be of interest to mention that the boilers in London's largest hotel, the Cumberland, are guaranteed freedom from scale by the installation of the Neckar hot-process softener with continuous return device; a further refinement is the Neckar deaerator which abstracts harmful gases from the boiler feed water. A similar guarantee is given for groups of boilers at various branches of Imperial Chemical Industries, Ltd., whilst a repeat order from F. Steiner and Co., Lancashire, more than doubling the original capacity of the plant, illustrates the confidence inspired by the use of Neckar plant, treatment and service.

Filtration in the Chemical Industry

Applications of Rotary Vacuum and Pressure Filters—The Sweetland and Kelly Types

IN practically every industrial process filtration plays an important part. Recent years have shown remarkable improvements in all classes of industrial equipment and processes, but probably none has undergone greater development than mechanical filtration in the separation of solids from liquor. The Dorr-Oliver Co., Ltd., has devoted over 30 years of exhaustive study to filtration problems, and realising that no single type of filter has yet been evolved equally

the rotary vacuum type of filter is of decided advantage. In order to meet the extremely large demand for this type of filter, the Dorr-Oliver Co., Ltd., has developed three distinct types of rotary vacuum filters—the Oliver drum filter,



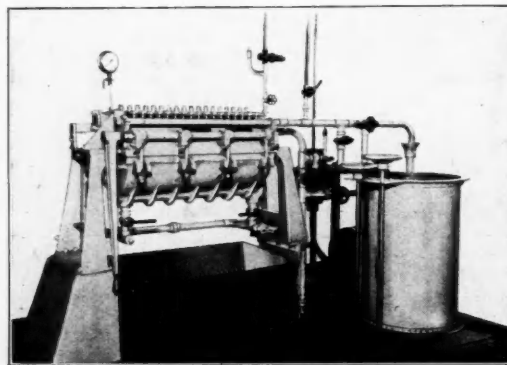
The Dorrco Rotary Vacuum Filter.

suited to the many different filtration problems encountered in the chemical and industrial fields, have developed both the "continuous rotary vacuum" and the "pressure" types of filter, both of which have their particular range of application.



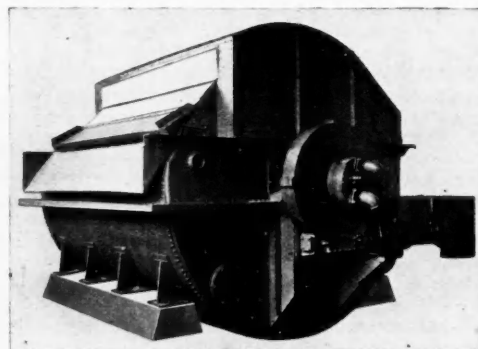
Oliver Disc Type Filters dewatering Cement Slurry.

Generally speaking, rotary vacuum filters are most successfully employed for the filtration and washing of products containing a reasonably large percentage of fairly free filtering suspended solids. For materials complying with this requirement, and where the tonnage handled is sufficiently large, the continuous and automatic operation of



Sweetland Filter operating upon Clarification of Oil.

the Oliver disc filter and the Dorrco filter, each of which have their particular range of application and are manufactured in many different sizes and types to meet varying requirements, and of materials suitable for the different problems involved whether acid, alkaline or neutral.



Oliver Drum Type Rotary Vacuum Filter.

For materials requiring higher filtration pressure than that obtainable under vacuum filtration conditions, the Dorr-Oliver Co., Ltd., have developed and perfected two distinct types of pressure filter, namely, the Sweetland pressure filter and the Kelly pressure filter, each of which has its own particular range of application.

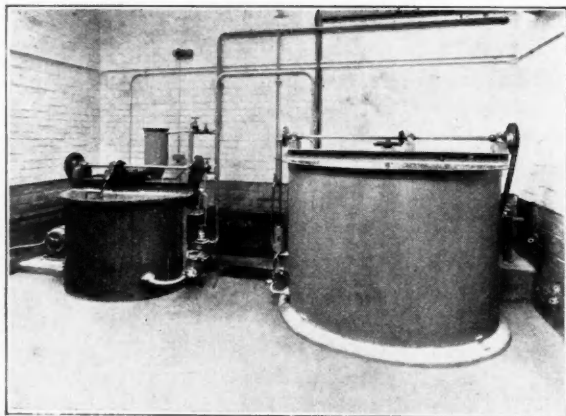
The Sweetland filter is suitable for working pressure up to 50 lb. per sq. in., and was primarily designed to overcome the obvious limitations of the plate-and-frame press. The uses of the Sweetland filter are numerous and varied; among the manufactures where it plays an important part may be mentioned cane and beet sugar, chemicals and dye-stuffs, the filtration of syrups, beverages, vegetable and mineral oils. Several special types of this filter are available, each designed to deal with a different product or group of products, and manufactured of materials suitable for the various products handled. Where pressures in excess of that obtainable upon the Sweetland filter are necessary, the Kelly pressure filter is available, and is capable of being operated at pressures up to 250 lb. per sq. in. Originally designed for use in the metallurgical field it has proved very serviceable in the chemical, ceramic and oil industries. In the latter field, many refineries have installed Kelly filters for the filtration of residuum from cracking still operation.

Water Treatment Plants for the London Midland and Scottish Railway

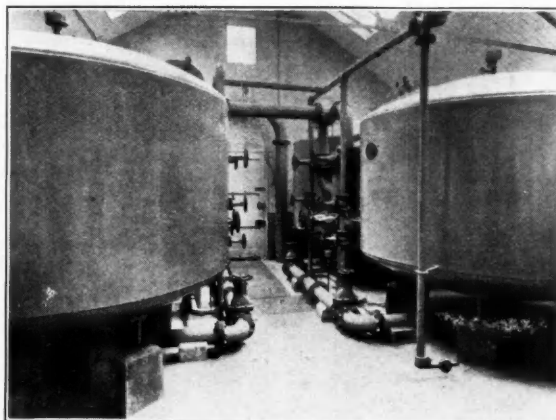
Sixteen Plants in Operation

INSTALLATIONS of water purification plant recently carried through by the Paterson Engineering Co., Ltd., embody a number of interesting developments in methods of plant control and administration of chemical reagents. The company has in hand a contract in connection with the Stoke Newington pumping station of the Metropolitan Water

veyor is readily adjustable during operation of the plant controls the distance of travel of pawls over a ratchet wheel, and so determining the amount of chemical delivered. When feeding chemicals such as lime, soda ash, etc., the reagent storage hopper is provided with suitable agitators to prevent arching or caking of the reagents. The Paterson dry feeder



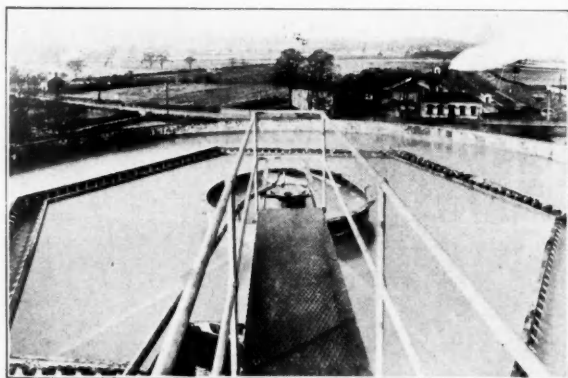
Chemical Storage and Proportioning Gear in a typical L.M.S. Plant.



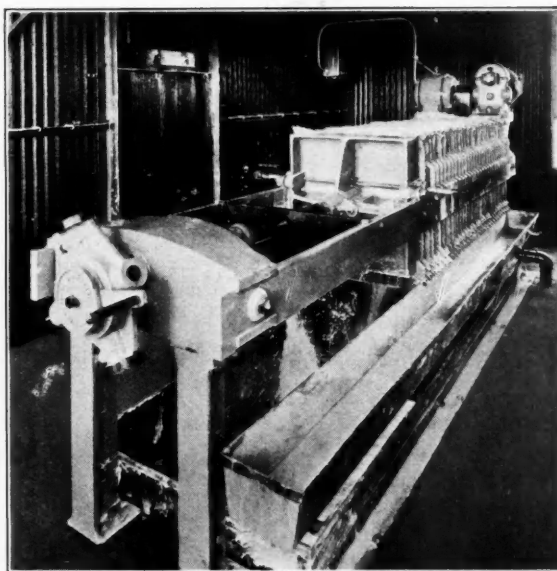
Pressure Filter at one of the L.M.S. Installations.

Board where extensions and modernisation to a total cost of £100,000 are in progress. Twelve large rapid gravity filters are being installed to deal with a normal daily flow of 34,000,000 gal. and the equipment embodies the very latest devices in rapid filter practice, including hydraulic control of all the valves from operating tables placed in the main walkway of the filter house. Another feature of this plant in common with various other recent installations is the automatic control of the outflow from each filter by means of a hydraulically operated regulator of the closed venturi type. This improvement possesses several important advantages—turning a hand wheel on a graduated fulcrum arm which takes over previous practice—low loss of head in passing through the controller, the discharge of the filtrate from each unit in an enclosed circuit so avoiding possibility of con-

can be supplied as a self-contained unit consisting of storage hopper, feeder, base, mixing chamber, electric motor with starter and speed reduction gear. Where the requisite water power is available a Pelton wheel is substituted for the electric drive.



L.M.S. Soft Water Collecting Launder.



Sludge Dewatering is one of the features of many of the L.M.S. Installations. Here is a Dewatering Plant.

tamination and the simplification of constructional work with consequent reduction in initial cost.

A development in the administration of the chemical reagents required in connection with water treatment is the use of apparatus for feeding the chemicals in a dry powdered form. The rate of feed by means of a double screw con-

The satisfactory sterilisation of water supplies by the addition of gaseous chlorine sometimes demands some form of auxiliary treatment to prevent any chlorinous taste in the treated water. For this purpose a de-chlorinating filter has been developed by the Paterson Engineering Co., in which,

after chlorination, the flow passes through a bed of specially prepared activated charcoal producing an effectually sterilised supply free from chlorine taste, in very way suitable for potable purposes. When required the charcoal can be added to the water undergoing treatment in a powdered form by means of the dry feeder described above; in other cases it is more convenient to adopt "wet feed" application then being effected by the standard Osilameter chemical supply gear as used for water softening purposes.

Engine Boiler Water Treatment

A recent development of importance in connection with water treatment in this country is the decision of the L.M.S. R. Co. to adopt a large scale programme of locomotive boiler water purification. The Paterson Engineering Co. was entrusted with a contract for sixteen large plants having an aggregate daily capacity of over 6,000,000 gal., which plants are now in normal operation at watering stations on the main lines. At present the company is engaged on a repeat order for similar plant of 27,000 gal. per hour at Northampton. Five plants are dealing with well waters, five river waters, two canal waters and four obtain their supply from the local authority. It will be appreciated that the softeners are dealing with waters subject to considerable variation in chemical characteristics. The hardness of the raw waters vary from 9° to 29°, while after softening they have a hardness of 2.5° to 4.°

Paterson plants are installed at the following points on the L.M.S. the maximum output of each plant in gal. per hour being given: Kenyon Junction, 30,000; Whitmore, 30,000; Hademore, 20,000; Nuneaton, 15,000; Northampton, 15,000; Bletchley, 12,000; Leighton Buzzard, 4,000; Helli-field, 8,000; Toton, 28,000; Melton Mowbray, 20,000; Kettering, 7,000; Wellingborough, 17,000; Oakley, 20,000; St. Albans, 2,000; Cricklewood, 16,000; Kentish Town, 16,000.

A number of novel features are incorporated in the construction of these installations, which had to be designed to meet a critical duty, necessitating accurate proportional addition of the chemical reagents and maximum efficiency of the settling and filtration arrangements. Each installation is so arranged that the addition of lime, soda ash, and sulphate of alumina required for chemical treatment of the water is effected in strict proportionality to the flow of water being pumped either on to the plant by the hard water pumps or from the softened water outlet. The equipment in connection with the preparation and addition of the chemicals is arranged at ground level in brick buildings used also as housing over the pressure filters and auxiliary equipment with a portion reserved as chemical store. In some cases the patented by-pass type Osilameter gear is employed, whereby the chemical solutions are added to a portion of the on-coming water before it joins the main bulk undergoing treatment, after which the mixture of raw water and reagents is pumped on to the top of the vertical steel reaction and precipitation tanks. Where conditions permit the chemical solutions are prepared in vertical steel tanks fitted with agitating devices and passed from thence to similar storage tanks of 18 hours capacity, and raised to the top of the reaction tank by a pump working in synchronism with the main hard or soft water pump.

The Precipitation Tanks

The chemically treated water flows downward through a mixing chamber in the form of a central compartment of the reaction tank, where intimate mixture is obtained by a patented arrangement. The precipitation tanks are constructed of mild steel plate having a water content in most cases equivalent to six hours' capacity of the plant, although in some cases the experiments carried out before installation of the plant showed that satisfactory results could be obtained by four hours settlement. Arrangements are provided for causing adequate settlement of the suspended impurities on the bottom of the reaction tanks, where it is discharged through sludge draw-off devices either to waste or to sludge de-watering plant referred to later.

The chemically treated and softened water leaves the sedimentation tank at the top after completion of the chemical reaction during the six or four hours of its retention therein, and passes on to mechanical filters of the pressure type for removal of the last trace of suspended matter and

production of a bright clear colourless soft water eminently suitable for use in locomotive boilers. The filters provided are of the standard air cleansed type similar to those employed in the treatment of drinking and domestic water distributed by public authorities. Filtration is effected during downward passage through a bed of specially graded Leighton Buzzard sand contained in steel cylinders of either vertical or horizontal construction, according to the site conditions and the maximum hourly output required.

The Sludge Problem

A feature of many of the installations is the inclusion of means for conveniently converting the thick wet sludge discharged from the softeners into a state permitting of ready handling and its ultimate disposal from the plant site. In some cases it is permissible to discharge the sludge direct on to adjoining land, but where no such facilities exist the plant is designed for discharging the sludge from the bottom of the reaction tank on to filter presses, where the bulk of the water is squeezed out and the solid matter formed into semi-dry cakes suitable for transferring into trucks for conveyance to the point of disposal. The sludge press house is in one or two of the installations placed on an elevated gantry over the rail track, permitting of the press cakes being dropped immediately into a wagon standing beneath.

The water softeners have been in normal operation for several months and the results obtained have been so satisfactory that the railway company is considering the provision of water softening plants at all suitable points on its system.

"The Independent"

Sir Ernest Benn's New Enterprise

READERS of THE CHEMICAL AGE, who share the point of view for which Sir Ernest Benn has fought so strenuously for many years past, will be interested in the new enterprise, the anti-political weekly, "The Independent," which is to appear from next Saturday. The arrangements have been planned with a view to producing a high-class, illustrated paper, embodying not only the characteristics of the ordinary weekly review, but some of the delights of the more expensive monthly magazines. These plans from their nature put a definite limit on quantity production. In point of fact the maximum weekly issue which can be produced in this manner amounts to 40,000 copies. Such a circulation is not yet known among journals of this class, but "The Independent" seems likely to establish a class of its own, for so great has been the demand and so widespread the interest that the trade orders for the new weekly have already reached the maximum supply. The position as we go to press is that the whole edition has been rationed to the wholesale newsagents and through them to the retailers. In these circumstances the only way to make sure of a copy of "The Independent" is to place an order at once with a newsagent.

The Pharmacy and Poisons Act

Operative from October 1

IMPORTANT changes with regard to the sale of poisons will be made by the Pharmacy and Poisons Act, 1933, the first sections of which comes into operation on October 1. Poisons will then be more difficult to obtain, their sale from automatic machines will be prohibited, and every seller of poisons will have to be registered. A Poisons Board, with wide powers, is also to be set up to control the sale and distribution of poisons. When this board operates it will take over the duty at present performed by the council of the Pharmaceutical Society of Great Britain in the task of advising the Government on what are to be considered poisons and what regulations should be made. The board's real difficulty will be where to draw the line between the free distribution of poisons necessary for industry and the imposition of restrictions to prevent their misuse. Another important new point is the inspection of sellers' shops. Registered pharmacists will be appointed to inspect chemists' shops, and listed sellers will be inspected by officers of the local authority, who may or may not be pharmacists themselves.

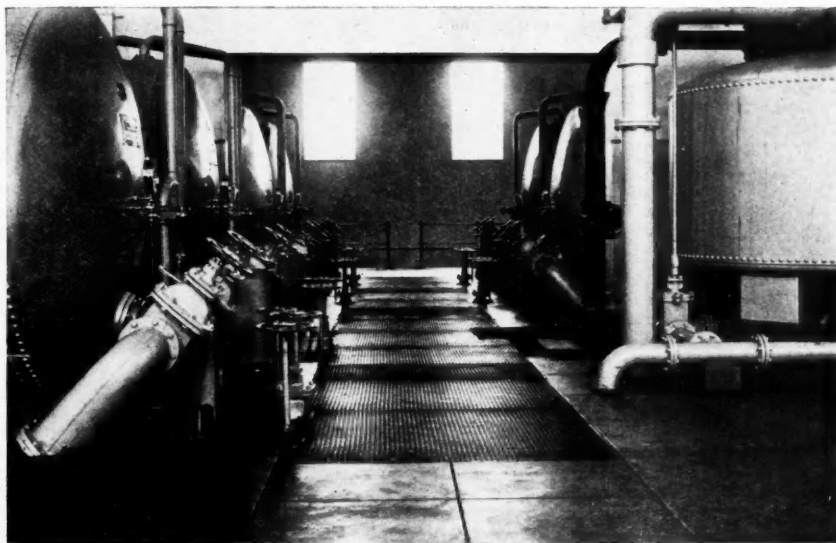
Scientific Control for Water Supplies

Improvement for Effecting the Draw-off of Filter Wash Water

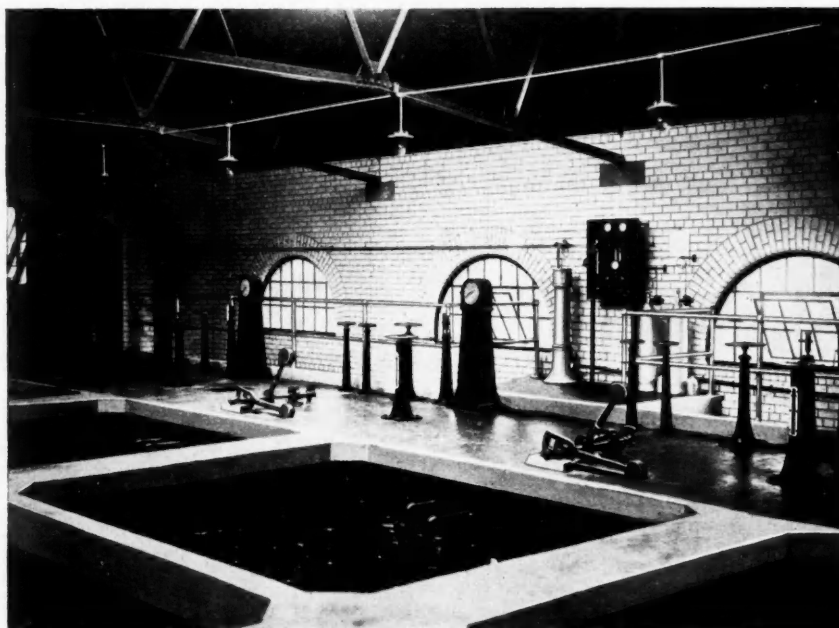
MUCH progress has been made by The Candy Filter Company, of Hanwell, in the design and manufacture of water treatment plant. Plant supplied by this company includes gravity and pressure filters of all types, employing air and water for cleansing and incorporating a number of features of unusual interest.

In most systems the filter strainer system comprises headers with metal laterals either carried on or built into a concrete floor. The laterals are fitted with a series of orifices for the collection of the filter effluent and distribution of the air and water used for scouring. This arrangement suffers from the defects of corrosion, electrolytic action between nipples and laterals in the presence of acid water, and the inherent disability that it is impossible to control such divergent quantities as 1 cu. ft. of air or 6 gallons of water per minute through the same orifice. The question of corrosion is especially important where many waters are rendered acid by the addition of chemicals for pre-treatment and cannot be made alkaline until after filtration. The Candy floor, which is entirely non-corrodible, consists of a special system of earthenware pipes embedded in concrete and connected

air and water through the same orifice. Instead of the normal supply to a few points in the bed, the Candy system comprises separate air connections to every pipe in the strainer system. Moreover, with the Candy system a combined air and water



A Typical Candy Horizontal Pressure Filter Installation.



A Battery of Candy Gravity Filters with Automatic Controls

into a central concrete under-channel. These pipes carry the Candy patent nozzles comprising a perforated dome to support the gravel, orifices for the collection of the filtered water and separate orifices for the control of the air and water used for scouring. With these nozzles absolutely even distribution of the air and water is assured in a way not possible with other systems which attempt to control the

scour can be carried out if desired.

The usual arrangement for the removal of wash-water consists of a series of troughs at a height of anything up to 18 in. above the sand bed. The velocity of the wash-water, on leaving the sand bed, tends to decrease; depository eddies are set up and the water tends to drop suspended matter. Moreover, a depth of as much as 18 in. over the whole bed is left behind at the end of every wash, and this must contain a large quantity of dirt that is not removed. In the Candy system, on the other hand, the wash-water is collected over a weir at the end of the bed, at a height of only $4\frac{1}{2}$ in. above the sand, from which it passes through the washout valve to the waste channel. The wash water, once it leaves the sand, flows horizontally across the bed; its velocity is continually increasing so that once the dirt has started moving, there is no possibility of it being deposited on the bed again. The effect of this design, which can be demonstrated by actual test, is that the dirt is removed from the sand quickly and efficiently. Perfect dis-

tribution of air and upwash, coupled with the draw-off system, also produce a super-efficient cleansing and extraordinary economy in air and wash-water consumption.

Iron-Removing Filters

For the removal of iron from water a special oxidising agent placed in the filter bed and known as Polarite is

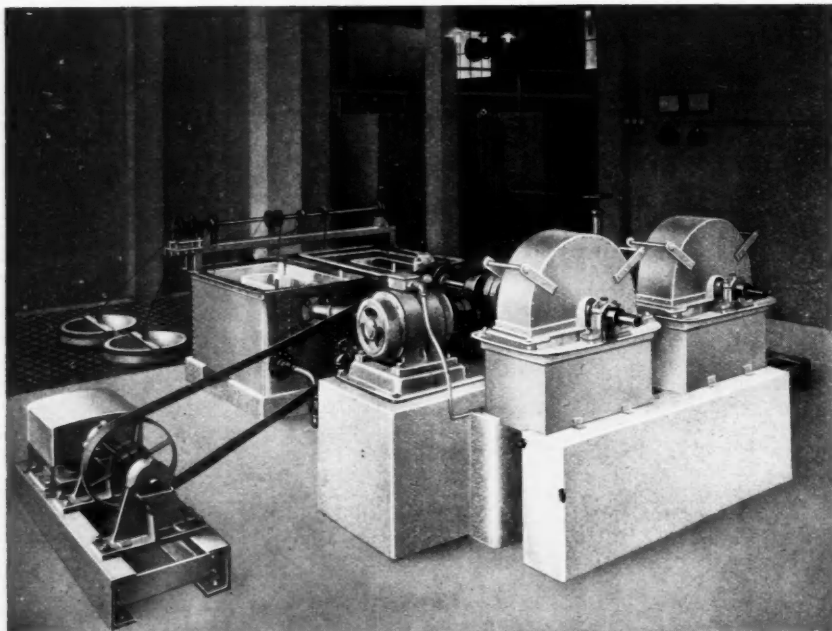
employed. This system can be adapted to gravity or pressure filters and is entirely automatic in action; no chemicals of any description are required. Filters of this type have been in use for many years at numerous works, including the

type is in operation at one of the largest power stations in the country for chlorinating the cooling water drawn from the river.

One of the difficulties hitherto experienced in obtaining accurate chlorination is that while the chlorine could be applied at a rate proportional to the flow of water the variation in the chlorine absorbing capacity of water had to be dealt with by the constant supervision of an attendant. This is now a difficulty of the past. The Candy patent photoclorinol, by the use of photo electric cells, carries out the whole process of testing the water and regulating the dose automatically and varies the dose in accordance with variations in the impurities of the water treated as well as variations in the rate of flow. The work of the attendant is reduced to periodical renewal of the chlorine cylinders. Replenishing of the reagent used and replacement of the battery when required, can be carried out as a routine at convenient times. The plant is entirely self-contained and can be fitted to instruments of other makes.

In the Candy patent chemical pump the plunger pulsations are transmitted hydraulically and the highly corrosive chlorine solution does not come in contact with the working parts. This is achieved by the use of an ingenious oil seal which has the added advantage from the point of view of cylinder lubrication that the plunger is

working in oil. The immense advantage of isolating the working parts of the pump from the chemical solution requires no stressing.



Candy Automatic Proportioning Gravity Type Lime Dosing Plant capable of treating up to 30,000,000 gallons of water per day

Waltham Abbey Pumping Station of the Metropolitan Water Board. The removal of free CO_2 is also achieved without the use of chemicals by the use of magnesite in the filter bed, which neutralises the acidity of the water and is also entirely automatic in its action.

For the successful treatment of many waters the addition of various chemicals such as sulphate of alumina, lime, chalk, soda ash, sodium silicate, sodium aluminate, etc., is essential. The accuracy and efficiency of the chemical proportioning and dosing plant, particularly when treating large supplies, is of primary importance. Under-dosing means loss of efficiency; over dosing means waste of chemicals. An interesting example of chemical dosing apparatus is the automatic proportioning miniature weir apparatus in which the flow of chemical solution is controlled by a miniature weir which is moved up and down in proportion to the depth of water over a main measuring weir. For pressure systems the differential head of a venturi tube is used to control the flow of chemical solution through an orifice, or by means of a submerged regulator, depending upon the conditions of working.

Chlorination Equipment

The equipment manufactured by the Candy Filter Co. for controlling and metering chlorine gas incorporates several unique features such as two-stage pressure reduction, the first stage being by means of a spring controlled reducing valve while the second stage is by a liquid head control ensuring an absolutely constant pressure. An interesting type of apparatus is the Candy patent clorexchange. It is the usual practice to weigh the chlorine cylinders from time to time to check the amount of chlorine still remaining. This normally results in a waste of 5 lb. to 10 lb. of liquid chlorine which is left in the so-called empty cylinders; constant supervision, moreover, is necessary. With the Candy patent clorexchange, on the other hand, the apparatus is automatically changed over from the exhausted cylinder or battery of cylinders to the new battery, but only when the old battery is entirely empty. There is, therefore, no waste of chlorine and supervision is reduced to a minimum, as the instrument can be left for considerable periods unattended and the used cylinders replaced when labour is available. A plant of this

Business Efficiency Exhibition

Lord Melchett at the White City

THE Business Efficiency Exhibition at the White City, London, was opened on Tuesday by Lord Melchett, and will remain open until October 6. Lord Melchett, in performing the ceremony, condemned criticism of Government interference in industry, and said that the only real instances they had seen of readjustment in certain industries had been provided by the Government. One began to wonder whether the industrialists of this country would ever realise their responsibilities and either set their house in order or not grumble when the Government tried to do it for them. Sir Josiah Stamp and Sir Charles Higham also spoke.

The display at the White City comprises every conceivable item of modern office equipment, from typewriter ribbons to dictograph telephones. The aim of the organisers, as set out in a foreword to the catalogue, is "to help you and your business. No matter what your trade or profession or whether you employ a staff of one or one thousand, if there is any book-keeping, correspondence or other office work to be done in your business, you will find at this exhibition the best way of doing it." One might go a step further and say that the exhibits show so many excellent methods of carrying out any particular operation that to decide on "the best way" turns out to be very difficult.

However, persons wishing to improve on their office equipment, both as regards efficiency and appearance, would almost certainly find what they wanted by visiting the Exhibition. An idea of the scope of the equipment displayed may be indicated by stating that it includes adding and calculating machines, autographic time recorders, cheque writing machines, duplicators, tabulating and listing machines, card indexes and office printing machines. Most of the well-known makers are represented, the total number of exhibitors being 60.

Filtration of Waste Oils from the Engine Room

Wells Patent Filter

THE Wells waste oil filter has now been before the public for over 30 years and may be considered an essential adjunct to every properly equipped engine room. It is well-known throughout the world and increasing sales testify to their utility and the correctness of the design. The floating siphon and the system of upward filtration are essential features, while the cheap and accurately fitting pads largely contribute to the efficiency of the machines. The makers cater for the smallest requirements, from a gallon of dirty oil to specially constructed plant giving an output of hundreds of gallons per week. They are also prepared to quote for special installations to meet the individual requirements of prospective customers. The first cost of one of these filters

bright red. They are fitted with a removable pump, which can either be used for pumping the oil from the cask into the cabinet or for pumping the oil from the cabinets into cans, etc. The pump is inside the cabinet, so that any overflow from it automatically runs back again. A dustproof lid is also fitted, inside which there is room to keep one or two oil cans or measures, and the lid can be padlocked if desired. The amount of oil remaining in the cabinet can be seen by the gauge which is fitted inside.

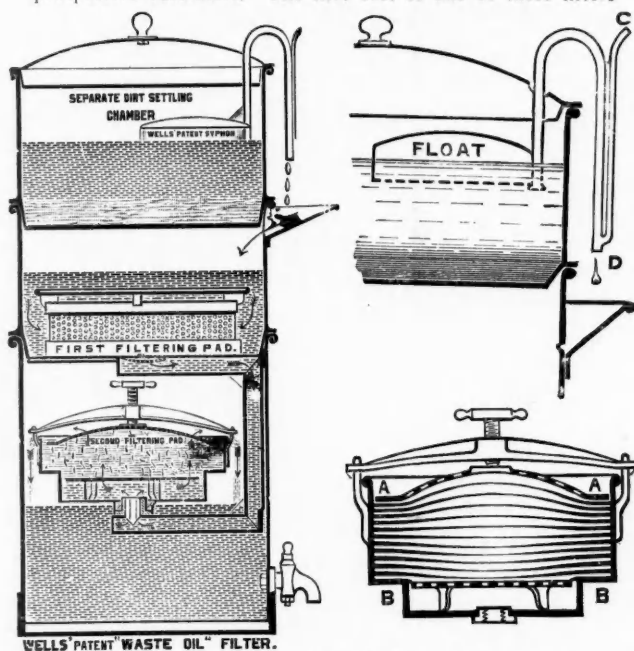
An Ideal Filtering Medium

Extended use of Filter-Guhr

KIESELGUHR is now established as an invaluable clarifying material and filter-aid in numerous industries, such as those producing sugar, glucose, fruit juices, syrups, vegetable oils, fats, mineral oils, varnish, cleaning spirits, waxes, vinegar, glycerin, and a variety of chemicals. In order to obtain the best results, however, it is indispensable that the kieselguhr used be of the highest quality obtainable. It must be extremely fine, very absorptive, and quite inert. It must also be sufficiently light to remain suspended in the liquid undergoing filtration. Further, it must facilitate filtration to the greatest extent possible, and give a brilliant filtrate.

After exhaustive research, it has now been possible to refine kieselguhr so as to obtain a super-grade calcined material of the highest purity, greatly superior to the ordinary grades. This product has been put on the market as "Filter-Guhr," which is offered by S. Heim, Ltd., in these grades: A white, ground powder (70 S), an extra-white, ground powder (70 S), and a white air-floated powder (80 S). Filter-Guhr is free from acid, being in fact slightly alkaline (to phenolphthalein). Where required, an absolutely neutral grade can be supplied. In general filtration practice the Filter-Guhr is added to the liquid to be filtered, which is well mixed, and passed into a suitable filtering apparatus. The quantity to be used varies greatly, and is a matter for experiment with the particular liquid under treatment; it can be said, however, that Filter-Guhr is extremely economical, compared with most other grades of kieselguhr at present on the market. A still better method is to pre-coat the cloths of the filter. This is done by mixing a little Filter-Guhr with a few gallons of the liquid, which is passed through the filter, so as to deposit a coating on the cloths. Filtration of the bulk of the liquid mixed with a suitable quantity of the Filter-Guhr then follows. This pre-coat prevents the pores of the cloths being slimed over, and the rate of filtration is thus much improved.

In the beet sugar factory a small addition of Filter-Guhr at an early stage in the process proves of surprising assistance. One should commence with the addition of about $\frac{1}{2}$ lb. per 10 sq. ft. of filtering surface at the second carbonisation. This both hastens filtration and lengthens the life of the presses considerably. In addition, the scums are no longer slimy, but on the contrary are firm and dry, so that the cakes are detached readily on unpacking the presses. In thick-juice filtration the Filter-Guhr should be added continuously, not intermittently. In filter-press work, some of the thick-juice diluted to 40–50° Brix say 2 to 3 times the contents of the press) are incorporated in a mixer with sufficient Filter-Guhr to provide a layer 2 mm. thick. After wetting the cloths of the press by pumping hot water through them, the contents of the mixer are allowed to run through under low pressure; then having added 5 to 10 lb. of Filter-Guhr per 1,000 gallons to the thick juice, and heated it to a suitable temperature, it is pumped through the pre-coated press. In filtration through gravity filters, the rate of flow is particularly facilitated, and the bags remain soft for a much longer time, besides being more readily cleaned. But whether presses or bag filters are in use, it is often possible to filter 5 times the volume of thick juice than without its addition, and thus realise considerable economy in time, labour and cloth.



Diagrammatic Arrangement of the Wells Patent Waste Oil Filter.

is quickly recovered, for, without chemical action, lubricants can be filtered again and again, dirt and foreign matter only being removed from the oil.

The patent floating siphon prevents water and other heavy impurities reaching the filtering medium. The siphon is a separate unit and is detachable from the settling tank. It is in continuous operation until the float touches the sediment or is within about an inch from the bottom of the container. The top portion of the settled oil only is therefore brought over for cleaning, and water, if any, with other heavy impurities, settled to the bottom of the chamber. The design of the filtering press is another important factor, the pad within being more highly compressed at its edges than in the centre, ensuring the passage of the oil through the middle and thus obviating side creep.

In dealing with the filtration of oils which are heavily impregnated with impurities or contain a fair percentage of water, the settlement of such oil in a settling tank prior to its final filtration in the waste oil filter is recommended. The Wells oil settling tank is supplied with a gauze tray at the top to catch the worst impurities, and with two taps; the upper tap drawing off the settled oil for transference to the filter, the lower for removal of refuse and water. It is made for 10 to 50 gallons capacity.

Wells' improved oil cabinets with removable barrel pump provide a clean, safe, and economical method of storing and distributing either lubricating or burning oils for daily use. The cabinets are strongly made of tinned steel and enamelled

Water Purification for Industrial Purposes

A Notable Installation of Rapid Gravity Filters

This article is based on information supplied by United Water Softeners, Ltd., who designed and erected an important rapid gravity filtration plant for the Gas Light and Coke Company at Beckton, which deals with 4,000,000 gallons of turbid tidal Thames water per day.

In almost all industries, water is used either for boiler feeding, heating, washing, or general process work, and in the great majority of cases, it is imperative that the water should be freed from its particular impurities, such as colour, matter in suspension, or scale-forming or corrosion-producing impurities. Where private sources of water supply exist, whether these be from wells, rivers or canals, it will usually be found a very paying proposition to treat and use this water instead of purchasing the town supply.

Water used for steam raising must be free from the scale-forming compounds of lime and magnesia, which would otherwise form a dense heat-insulating layer on the boiler surfaces. It must also be free from acidity, either mineral or organic, and from acid-producing salts such as iron and aluminium sulphates, magnesium chloride, magnesium and calcium nitrates, etc., which produce corrosion in the boiler and its fittings. In the textile industries the washing and dyeing of textile fabrics of all kinds calls for filtered and softened water in view of the fact that water containing hardness or suspended matter causes waste of soap and dyestuffs, and also causes streakiness and spotting of the goods, owing to the formation of compounds of lime and magnesia with the processing materials. At tanneries, when hides are softened in hard water a deposit of lime is left behind in the hides, which is found seriously inconvenient in subsequent manufacturing processes; in chrome tanning also, the presence of lime and magnesia in the tanning liquor is detrimental. Waters softened for this purpose require sand filtration. Large quantities of water are also used in paper making, and mechanical filtration is essential where the water is even in the slightest degree cloudy. Suspended matter, colour and iron must be entirely absent in the manufacturing of the best paper.

Sedimentation and Coagulation

Extensive practical development has been given of late years to modern processes of water purification, such as sedimentation, coagulation, filtration, aeration, sterilisation and softening of water supplies. The principles underlying each of these phases are well established, and form a sound scientific basis upon which modern types of water purification plants are constructed.

Sedimentation is usually effected in naturally formed ponds and lakes serving as impounding reservoirs, or in specially constructed basins. In purification plants treating clay-bearing and turbid waters, the sedimentation basins form a most important feature for the purpose of precipitation with chemicals as a necessary preliminary to filtration. The simplest method of removing suspended matter from water is to allow the water to remain quiescent for a sufficiently long period to permit the particles to fall to the bottom, so that clear water can be drawn off. This *intermittent system* takes considerable time; allowance must be made for periods out of service and, in addition, it requires comparatively large settling reservoirs. With correctly designed sedimentation tanks on the *continuous system*, where the water is constantly flowing through the plant, the larger and heavier particles which would speedily silt up and clog a filter, settle out in a moderately short space of time, and having removed the heavier suspended solids in this way, it is a much easier matter to coagulate and filter the water.

To obtain satisfactory purification by coagulation the physical and chemical characteristics of the water to be treated must be taken fully into account. The filtration of water through sand, however closely packed, results in the retention only of the larger impurities; whilst colour, colloidal clay and finely divided suspended matter pass freely through the filter until a film has formed on its surface. In rapid sand filtration the formation of a film is quickly brought about by the addition to the water of a coagulant, such as sulphate of

alumina. This salt is decomposed by the calcium carbonate present in the supply, with the formation of aluminium hydrate, which is a gelatine insoluble compound which instantly coagulates and precipitates the suspended matter in the water, thus rendering it easily filtered off. It also precipitates the colour and removes 90 per cent. of the bacteria present. The quantity required is very small, 1 lb. of sulphate of alumina being sufficient to coagulate the impurities in 10,000 gallons of water, the cost being only a minute fraction of a penny per 1,000 gallons. It should also be noted that no alumina goes into solution in the water. When the water does not contain sufficient calcium carbonate to react with the sulphate of alumina, some of the former must be added in an amount determined by the deficiency.

Addition of the Coagulant

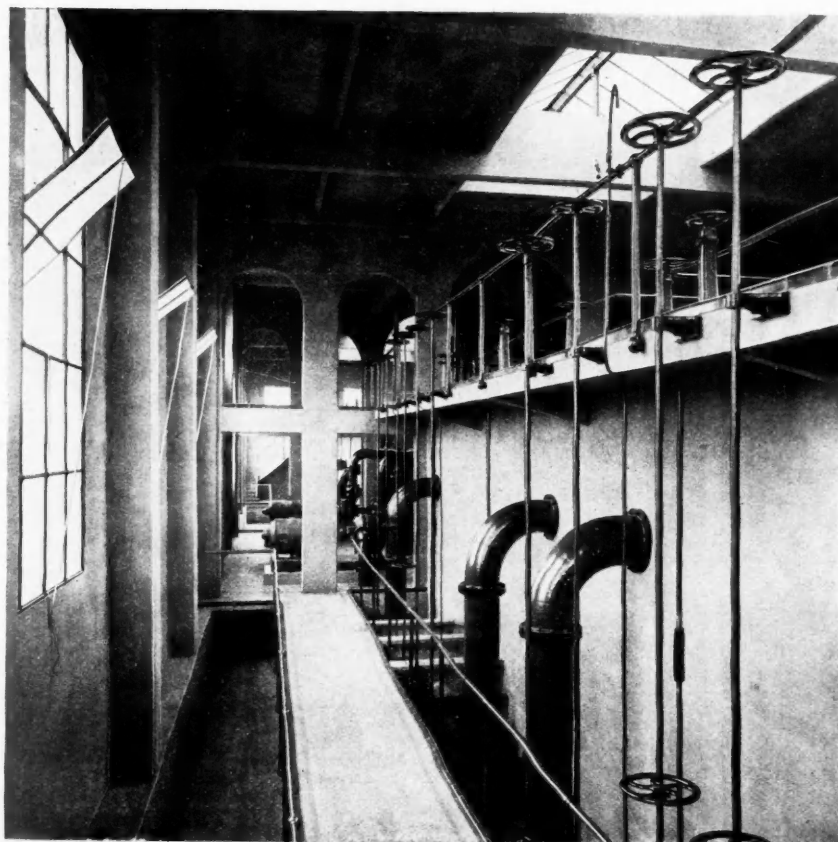
The addition of a suitable coagulant causes the finely divided and dispersed particles of suspended matter to gather into groups of flocculent masses, which are readily amenable to subsidence and filtration. Basins are usually provided as adjuncts to rapid filters in which the coagulating process may take place, the flocculated sediment being allowed to precipitate. The period of coagulation and subsidence for individual waters varies considerably, but the time allowed should in no case be so long that no coagulum remains to form suitable films on the filter beds. It is equally of importance that the addition of coagulant to the water should be accurately controlled, and provision made for its application at suitable points in the settling basins. The rate of water flow being gauged and known, the dose of chemical must be capable of being varied as occasion demands, by the provision of accurate automatic measuring apparatus. A thorough mixing of the chemical with the water must also be effected, since the efficiency of the coagulating compounds depends, in considerable measure, upon the formation of a large and well-defined floc, which is directly influenced by the temperature of the water, and by the salts and colloids in solution or suspension.

The principal distinction between *rapid* and *slow* systems of sand filtration is indicated by their respective qualifying terms. The filtering speed with a slow sand filter is, generally, only equal to about four vertical inches per hour, whereas preparatory chemical treatment of the water enables the rapid filter to deal efficiently with a filtering speed fifty times greater. In other words, 2,000,000 gal. per acre daily is the usual rate of operation with slow filters as against 100,000,000 gal. per acre daily with rapid filters. This extraordinary difference in capacity is attributable to the scientific use of suitable coagulants in conjunction with preliminary sedimentation.

Uniformity in Rate of Filtration

The quality of the filtered effluent is dependent on several leading features in design and operation. It is essential, for instance, that uniformity in the rate of filtration be maintained over the entire area of the filter bed. To effect this object a strainer system is installed in the filter tank, which serves the twofold purpose of uniformly collecting the water which has passed down through the sand and gravel beds, also evenly distributing the upward flow of cleansing water during the washing process. In the filter end supplied by United Water Softeners, Ltd., the efficiency of these operations is thoroughly secured by the Lassen-Hjort patent protected strainer. Many other factors directly affect filtration results, such as the depth of bed, size and uniformity of the sand grains, quantity and kind of coagulating compounds used, and the filtering speed.

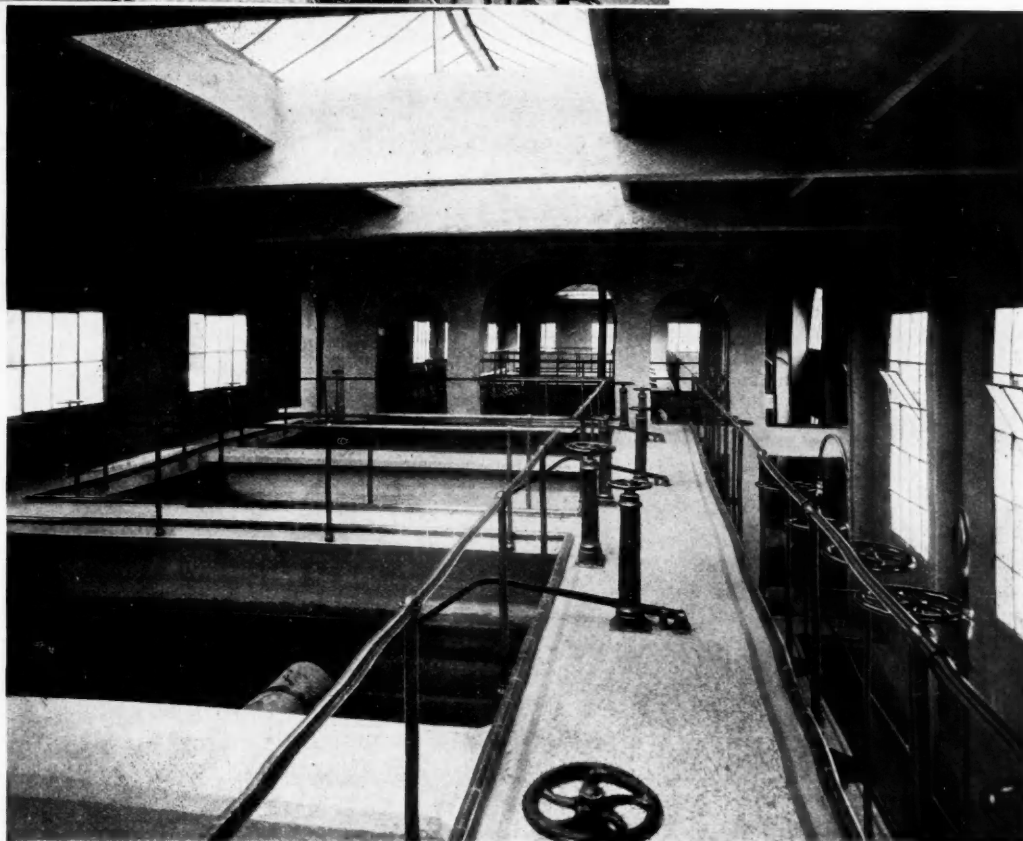
The filtering plant designed and constructed by United Water Softeners, Ltd., for the Gas Light and Coke Company,



The Rapid Gravity Water Filtration Plant at the Beckton Works of The Gas Light and Coke Company, supplied and erected by United Water Softeners, Ltd.

The picture on the left illustrates the lower platform, showing the inspection chamber and filtered water down-flow channel, with regulating valves.

The bottom photograph illustrates the control platform.



Beckton, comprises eight filters with two pairs of adjoining settling basins for coagulation and sedimentation. The filters are divided into two groups of four on either side of the pump house. The settling basins for each of the four filters are provided with sluice-gate arrangements, so that if necessary one pair of basins may be laid off and cleaned while the other pair is in operation. To the rear of the pump house, on a level above the basins, is placed the chemical house which accommodates the lime-mixing tanks and the measuring and recording apparatus. The water delivered from the river by the pumps on the pier is received into a concrete chamber furnished with baffles, whence it is delivered into a measuring channel, and then flows over two brass plate weirs of rectangular form, one larger than the other. The exact quantity of water passing over the larger weir at any time is measured and recorded. A definite portion of this incoming water passes by means of the smaller weir into an automatic measuring apparatus which is fitted with a chemical container and a chemical mixing valve so adjusted as to deliver the exact quantity of lime necessary to coagulate and precipitate the suspended and silicious matter contained in Thames water at Beckton. The lime solution is prepared in two mixing tanks, each of which is furnished with motor-driven agitators, and the solution passes by overhead pipes to the chemical container. The

water with the added lime solution falls into a long trough and then passes into distributor channels communicating with the settling basins.

The sedimentation basins, which are constructed in concrete with sloping bottoms, are of sufficient size to hold approximately 600,000 gal. of water, thus allowing a period of nearly four hours for reaction and sedimentation, when the plant is working at its full rated output of 4,000,000 gal. of purified water per day. During the passage of the water through the basins, the heavier impurities and a considerable portion of the coagulated flocculent are precipitated. Each filter, which is of the open type, is 22 ft. long by 12 ft. wide, giving a total filtering area of 2,112 sq. ft. for the eight filters, and when the rated flow of four million gal. per day is being dealt with by the whole of the filters, each square ft. of filtering surface will pass about 79 gal. of water per hour. The filtering medium employed is specially sifted and graded quartz sand supported on a bed of washed and graded gravel. Below the gravel there is a system of manifold collecting tubes furnished with safety strainers, by which the water is simultaneously drawn off from all parts of the filter bed. The water thus collected is discharged through a central pipe and passes through a ball control valve which ensures that water is always retained in the filter bed to a certain level.

Further Developments in the Use of Metafilters

By J. A. PICKARD, A.R.C.S., B.Sc., F.I.C.

THE past year has seen a widening of the fields of usefulness of the Metafilter, mainly in the direction of the filtration of

The Metafilter for the purification of transformer oil and carbonised switch oil, which was first mentioned in the filtra-

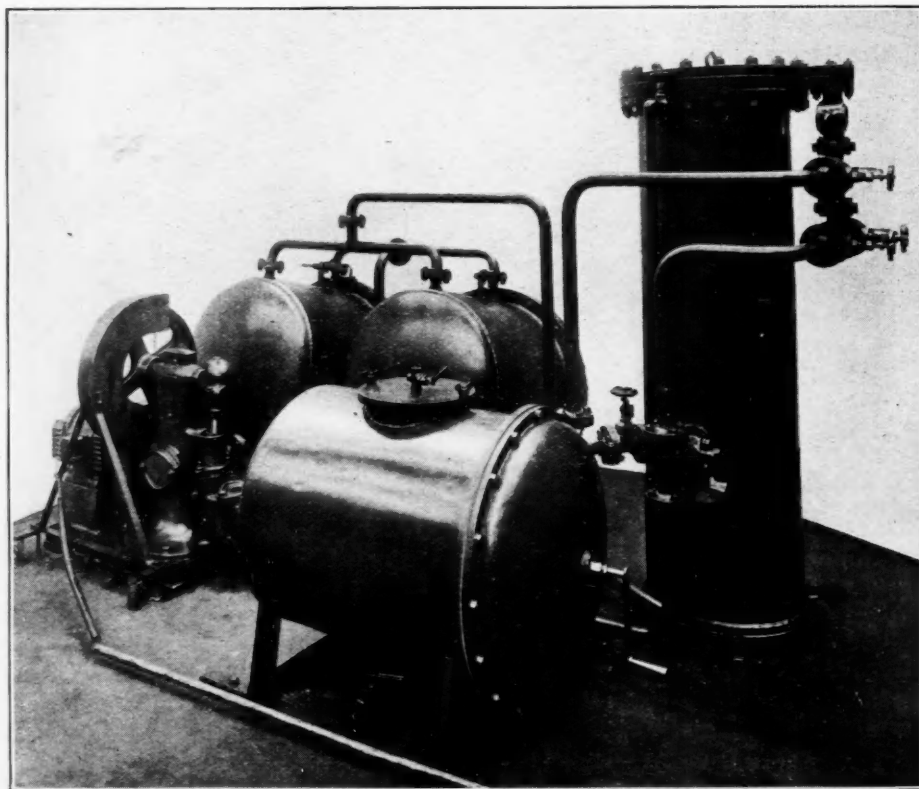
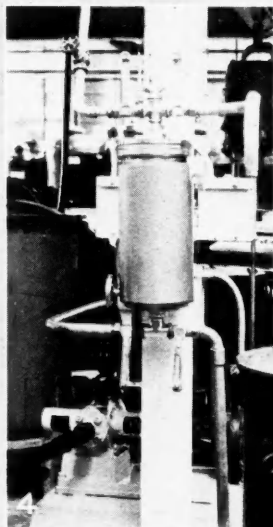


Fig. 1.—Metafilter for Transformer and Carbonised Switch Oil, with an output of 600 gallons per hour.

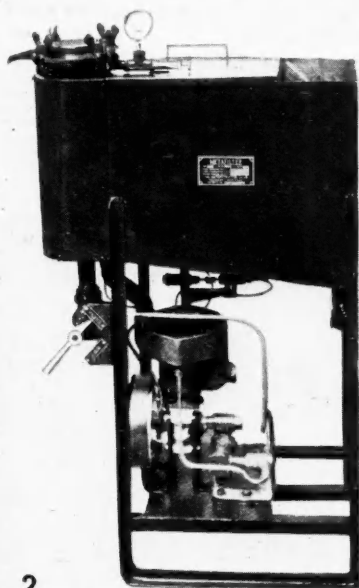
oil, but much business has been secured in water filtration, and special filters for a variety of different purposes have been produced.

tion number of THE CHEMICAL AGE last year, has proved to be of special interest in the electrical industry. The design has been simplified and units of very much larger output have

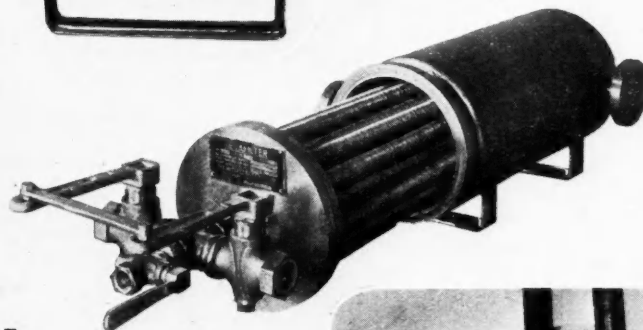
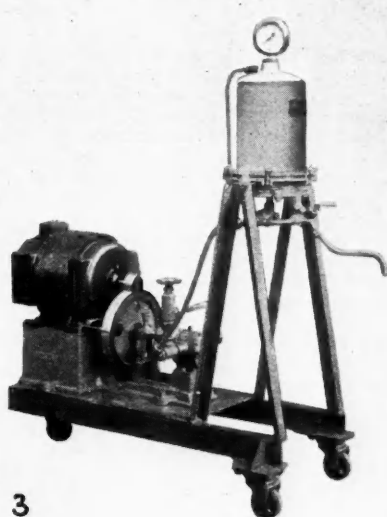
The Metafilter in Industry



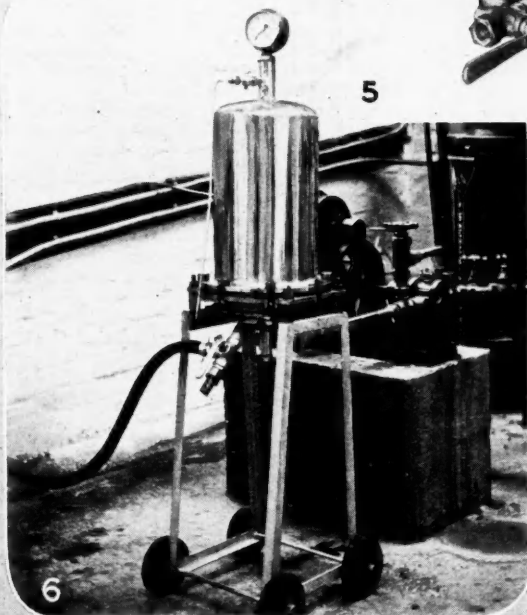
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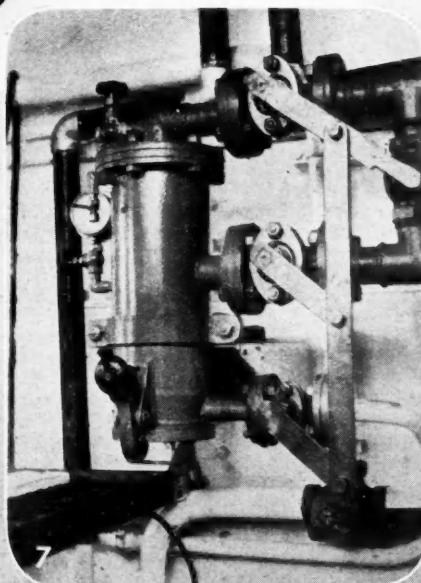
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Fig. 2.—Self-contained Oil Filtering Unit for Garages etc., producing clear transparent Lubricating Oil from Crank Case Drainings.
Fig. 3.—Portable Self-contained Metafilter for Pharmaceutical Work.
Fig. 4.—Metafilter, constructed entirely of Stainless Steel, for dealing with Shaving Cream.

Fig. 5.—Stainless Steel Metafilter, showing Interior.
Fig. 6.—Metafilter, constructed in Monel Metal, with polished Dome, as installed at a Mineral Water Factory to deal with Syrups.
Fig. 7.—Metafilter for Diesel Engine Lubricating Oil, as fitted to 600 h.p. Marine Diesel Engine.

been built. A Metafilter transformer oil purifying plant, as shown in Fig. 1, is supplied to one of the largest electrical generating undertakings in the Empire. This plant deals with 600 gallons of oil per hour, and is capable of purifying six to ten thousand gallons of oil with a single charge of "Metasil." The plant has been greatly simplified, and the model shown consists of a reciprocating plunger pump, a mixing pack for introducing the "Metasil," a static water eliminator, and the Metafilter. No changes have been made in the essential part of the plant—the Metafilter itself—which is still constructed from metafilter rings of standard type with a separation of 0.0015 in. between the rings. It has been found possible to cut down the interior volume of the filter by closer spacing of the pack centres. Much work has been done on investigating the nature of the best quality of metasil for this duty, and as a result Metasil A.W. has been introduced with a filtering rate much higher than that previously used with equal efficiency.

Filtration of Lubricating Oil

Another field in which great progress has been made is in the filtration of lubricating oil. The Metafilter attachment to motor cars, which was introduced some years ago, has proved so satisfactory in use that larger models have been developed for use with high power Diesel and other internal combustion engines. The principal operation is the same, but the amount of filter surface, and the capacity of the filter, have been increased to meet the larger demands of the big engines. A typical filter is shown in Fig. 7, fitted to the 600 h.p. Diesel engine of the Swedish ice-breaking ship, *Jaameri*. This filter has 4 sq. ft. of filter surface, and deals with about 80 gal. of lubricating oil per hour. It removes from the oil all gritty, metallic or carbonaceous particles of which the size exceeds one tenth of one thousandth of an inch, and consequently is superior to the centrifuge in this respect. This plant is not only unaffected by the specific gravity of the particles, but it is impossible to rush oil through it without purification. The filter shown is fitted on the main oil delivery pipe from the lubricating pump, and for safety is equipped with a by-pass spring loaded valve which comes into operation if the back pressure of the filter rises sufficiently through choking to interfere with the main flow of the oil.

The cleaning of the filter is simplicity itself. The operating valves are linked together, and when the cleaning handle is pulled down the filter is temporarily isolated, the oil proceeding to the engine through the by-pass. The contents of the filter are then drained out and a strong blast of air applied to the top, which removes the whole of the dirt through the quickly opening bottom. The filter is returned to service within a few minutes of commencing the cleaning operation.

A Filter for Garage Use

Another application of the Metafilter for oil purification, which will be of interest, is the Metafilter for used lubricating oil which is shown in Fig. 2. This is intended for use by transport companies and garages, and is a self-contained plant with which it is only necessary to pour in the dirty oil at one end and start the engine, to accomplish the whole process, of elimination of water, grit, colloidal carbon and "dilution." The plant consists of a supply tank into which the oil to be filtered is poured through a straining gauze. The oil then passes through a thermostatically controlled valve, and proceeds to the bottom of a deep annular channel surrounding the cylinder of a two stroke engine, where it is raised to a temperature of 140° C. thus eliminating petrol and water. The oil is only maintained momentarily at this temperature and flows away through a bubble trap to a pump which is driven by the engine, and delivers the oil to the base of the Metafilter shown on the left. Here a charge of metasil is mixed with the oil, and when the head carrying the metafilter packs has been placed in position, the filter bed rapidly forms, and after a small quantity of first runnings, clear transparent oil is delivered. The output of this filter is from 2 to 5 gallons per hour.

In the direction of water filtration a notable advancement has been achieved. Hitherto, the drawback with all filters for domestic as well as small scale use has been that whilst some of them are effective at the commencement, bacteria held back by the filtering medium propagate there, and

speedily grow through the mass. The result of this is that after a short time bacteria appear on the delivery side, and the filter becomes ineffective. By making use of a special variety of filter bed in which some of the particles of metasil are coated with an infinitesimally thin layer of silver, this defect has been quite eliminated. Although silver cannot be looked upon as an antiseptic, its presence is inimical to the growth of bacteria, which do not propagate upon it. Very careful tests undertaken by the Royal Army Medical College with the extremely vigorous and rapidly reproducing organism *B. Prodigiosus*, show that even after several days rest, and with a sudden start, the number of organisms passing the filter was negligible, and substantial sterility is secured under all conditions. These facts are brought out in the record of test given in the following table, which reports a test on raw Thames water containing 225 ml. of a broth culture of *B. prodigiosus* in a batch of 50-gallons passed through the Metafilter, the number of organisms growing on agar at 37° C. being counted for the first litre collected and samples taken each day:—

	Raw water	First litre	5 minutes
First day	264,000	236	2
Rest of	One day.		
Second day	112,000	164	15
Rest of	Two days.		
Third day	131,000	32	6
Rest of	One day.		
Fourth day	26,000	22	4
Rest of	One day.		
Fifth day	351,000*	1	2
Rest of	One day.		
Sixth day	189,000	22	8
Rest of	One day.		
Seventh day	188,000	147	14

*More broth culture added.

A Stainless Steel Filter

Amongst special filters of particular interest recently built, mention may be made of one constructed entirely from stainless steel, on the design of Mr. E. A. J. Koch, for Maclean's, Ltd., manufacturing chemists. This filter is used for the elimination of the smallest gritty particles from shaving cream. It is shown in position in Fig. 4. The shaving cream which is contained in a 200 gallon pressure vessel is delivered to the pump shown on the left, which passes it on to the Metafilter. The internal construction of the Metafilter is shown in Fig. 5, which in this instance is used without the necessity of employing a filter bed. The cream proceeds from the outside to the inside of the filter packs and thence away through the delivery head, and is ready for tubing.

Metafilters for syrups are now almost standard practice in mineral water works. A typical installation is shown in Fig. 6, at the works of Cantrell and Cochrane. These Metafilters are used for sterilising sugar syrups and also in clarifying cordials and flavouring solutions used. The filters consist of vertically mounted ring Metafilter packs of monel metal or stainless steel, and are used in conjunction with filter beds of metasil. The ease of operation and simplicity of cleaning of these filters is a great boon, and is rapidly ousting the old-fashioned bag and paper filters. A self-contained portable model, of the same general type as the syrup filters (Fig. 3), is also made, and is in use for the clarification of syrup of squills, extracts, cod liver oil and many other liquids. It is constructed in monel metal, stainless steel, or other material as required, and is supplied as a self-contained unit with pump or movable stand. The output varies between 5 and 200 gallons per hour.

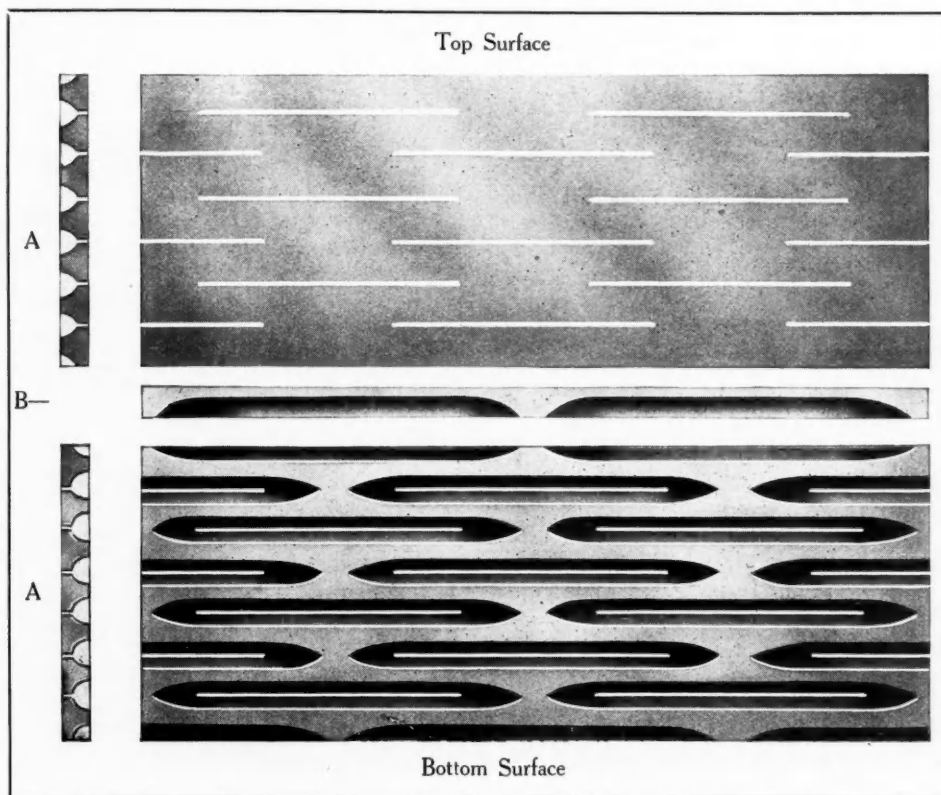
A GERMAN firm announces the production of a textile containing a radioactive substance in such close combination that no loss in activity occurs as a result of washing and other processes. This object is said to be achieved by dissolving radium sulphate, for example, in the rayon spinning solutions. Fabrics giving off mild radiations result from the addition of 0.02 per cent. of the radioactive substance to the solution. Higher proportions of radium salt naturally render the fabrics more intensely radioactive.

Perforated Metals for Filtration Purposes

Floor Plate and Centrifugal Machine Linings

PERFORATED metals for any screening, grading, cleaning, sorting and filtering requirement are supplied by G. A. Harvey and Co. (London) Ltd. Their elaborate catalogue of 186 pages contains full size illustrations and details of the numerous patterns of perforations they are able to produce, including round, square, diamond square, slots of various types and placings, stabbed, embossed and ornamental patterns; in all there are over 2,600 varieties. They claim to be able to supply any perforated metal requirement for any

supplied in brass or bronze as desired. Each section is provided with flat bar supports and feet. Harveys' long experience in this class of work has enabled them to produce filter floors of the highest filtering efficiency. The slots, which are conical in section, are carefully milled to ensure the utmost accuracy in filtration. The advantage of the conical-shaped slot is that clogging of the apertures is prevented, the wide opening on the underside of the floor allowing a constant and uniform rate of filtration to be main-



Actual size of Filter Floor Plates. A-A shows the transverse section, and B the longitudinal section.

purpose. In addition to iron and steel they perforate nickel, stainless steel, copper, brass, bronze, monel metal, aluminium, lead, delt metal, duralumin, zinc and tinplates, as well as paper, boards and cloth.

"Harco" filter linings for centrifugal machines are of an improved type, and have been specially designed for rapid and economical sugar production and other purposes where close and accurate filtering is required. These linings are supplied in brass or copper of extra thickness, with either elongated conical slots or conical round holes as desired. They present a smooth, polished surface on the interior of the centrifugal baskets. Both types of holes are conical in shape. The wide outlet on the outside of the linings prevents clogging and greatly assists filtration; the hole retains its size and shape, with the result that a regular product is always ensured. The absence of clogging not only increases the productive capacity and efficiency of the centrifugal machine, but saves the time occupied by costly stoppages for clearing clogged holes. Such linings, moreover, are of extra thickness, strength, and stability to withstand the heaviest strain.

Circular filter floors for breweries and distilleries are made in either segmental or rectangular sections, and can be

tained. The "Harco" filter floors are not only claimed to be the most efficient type in existence, but are constructed for strength and durability. Maintenance costs are negligible, and renewals, when necessary, can be easily and quickly carried out. The type of perforation illustrated ensures the greatest possible yield from the filtering and uniformity in the result, together with a considerable saving of time. The surface of the plate is quite smooth and easily cleaned with a brush. The depth of the parallel portion of the slot varies according to the thickness of the plate, and is arranged to give the maximum strength and durability. Standard dimensions are:—Length of slot, 40.0 mm.; width of slot, 0.6 mm.; distance apart at ends, 21.0 mm.; distance apart at sides, 6.5 mm.; thickness 3 mm. to 8 mm.

"Harco" filter press plates also have a high reputation for strength, efficiency, and durability. They are manufactured in any metal required, either round or square; also specially shaped and with centre hole if desired. Any size of filtering area can be supplied and the perforations range from 0.5 mm. upwards. They are in use for filtering processes in connection with fruit pulp, juices, paints, varnish, dyes, colours, cellulose, edible fats, sugar, and works effluents of various kinds.

Filtration Plants for Municipalities

Some Recent Activities

THE activities of Bell Brothers (Manchester, 1927), Ltd., during the past twelve months have extended to all the various phases of water purification and its allied subjects. They have installed large filtration plants during the past year to deal with domestic supplies for the county of Ayr at Afton and Kerse, for the Huddersfield Corporation and many others, whilst they have been favoured with an order to supply a filtration plant for the Corporation of Douglas, Isle of Man, to deal with $3\frac{1}{2}$ million gal. per day. This latter plant when installed will represent the most efficient and most up-to-date plant of its kind in the world. It will consist of mechanically agitated pressure filters, and the auxiliary chemical apparatus to work in conjunction with the filters will be of the most up-to-date design.

Whilst the "Bell" mechanically agitated filters still retain their supremacy, Bell Brothers are able to put forward air scoured plants, both vertical and horizontal types, and also rapid gravity filters. During the year an order has been received from the Bexhill Corporation for a rapid gravity plant, this being an extension to an existing plant of another make installed some years ago. It will, no doubt, also be of interest to know that Bell Brothers are able to meet demands in the case of emergency, and during September an urgent request was received for filtration plant from the Boston Corporation, and this plant, consisting of four 8 ft. diameter filters complete with chemical apparatus was despatched immediately from stock, to be finished and working within three weeks.

Swimming Bath Developments

The growth of swimming baths has been greater than ever during the past year, and Bell Brothers have been favoured with a large number of orders for various types of filtration plant. In particular, reference might be made to an order received for Wallasey baths, consisting of four open-type rapid gravity filters together with the necessary pumps, chemical apparatus, etc. A considerable number of orders received have been in connection with private baths built by owners of hotels, road-houses, etc., and in every case the results obtained by the installations of "Bell" plants have been eminently satisfactory, and have enhanced the popularity of the swimming pools concerned.

When dealing with emergency water supplies it is sometimes quite sufficient to provide some form of sterilisation without the necessity of filtration, and this is easily and simply done by means of a "Bell" gas chlorination plant many of which have been supplied for dealing with all forms of contamination. Chlorination is, of course, almost universally used in conjunction with filters on swimming baths, and it is becoming more and more prominent in connection with the purification of water for various forms of industry, such as paper works, sugar beet factories, canneries, etc.

In connection with the purification of water for industrial purposes it is of interest to note that Bell Brothers have installed more plants for various forms of industries, particularly paper making, than any other filter manufacturers, and during the year an order has been received from the British New-Wrap Co., Ltd., Wigton, and a further order from British Celanese, Ltd. The question of water softening is, of course, allied to filtration, and Bell Brothers are manufacturers of various types of water softening plant ranging from small household softeners suitable for the smallest of households up to the large plants installed for municipal and industrial supplies. Lastly there is the question of special filters which are designed for particular duty, and for dealing with liquids other than water, such as acids, chemical liquors, wines, etc.

A HIGH thermal efficiency as compared with water vapour is claimed for aluminium bromide by Barjot in "Le Génie Civil," 1933 (page 13). It melts at 93°C ., boils at 267°C ., and does not decompose until $1,100^{\circ}\text{C}$. is reached. Being non-toxic and comparatively cheap, it might acquire some importance as a heat-transferring agent if it were not for the facts that it combines almost explosively with water and requires more complicated plant than mercury vapour.

The True Value of a Filter-Aid

Saving on Filtration Costs

IN considering the installation of new filter plant many manufacturers regard the use of a diatomaceous silica filter-aid as a last resort, to be used only if the filters do not operate up to expectations which may be either as regards the clarity of the filtrate or the length of run between cleanings. This is the wrong conception of the value of the true filter-aid, which is indeed the basis of many filtration processes.

The filtration section of the Johns-Manville organisation has probably a more world-wide experience of "clarification" filtration problems than many of the filter manufacturers. The application of the well-known "Celite" filter-aids, "Hyflo Supercel," standard "Supercel" and "Filtercel," is acknowledged as an indispensable factor for efficient filtration in many industries. Manufacturers considering plans for new filtration equipment would be well advised to investigate at the outset the possibilities of the use of Celite filter-aids and probably save themselves considerable money and time.

Rapid Filtering Properties

The features of Celite filter-aids which make them superior to other diatomaceous silica powders are their unusually high porosity, uniformity and freedom from metallic impurities and moisture. Hyflo Supercel especially is unique in its rapid filtering properties, giving a flow rate through the filter approximately three times that of standard Supercel.

The use of these filter-aids should decrease the total filtration costs, but obviously unless the filter station is adjusted so as to be convenient for filter-aid application the best results cannot be expected. A day's stop for a few alterations in piping and installation of a pre-coating tank may mean a saving of large sums of money over a period of years. The principle of filter-aid application is invariably the same. An initial coating of the porous powder forms a perfect clarifying surface which is comparatively non-resistant to the flow of the liquid, while the addition of a small quantity of the aid to the main batch means that the deposit formed has a porous and free filtering characteristic, permitting the full cake space to be utilised or filtration time for a given quantity of liquid to be greatly reduced. Savings are in terms of cloth costs, laundering, labour for cleaning, etc.

Liquids filtered in this manner include vinegar, cider, fruit juices, acids, sugar syrups, gelatine liquors, gum arabic and oils of all types. It should be remembered that the present is an age of specialisation and that filtration is a very important factor in manufacturing processes.

Estimation of Palladium

Avoiding Difficulties of Incomplete Ignition

METHODS for the estimation of palladium usually require igniting some compound of palladium to the metal. When this is done in air the metallic residue always has a blue or purple colour, instead of the grey colour of palladium sponge, indicating that the metal is partially oxidised. Some methods direct that the residue be heated in an atmosphere of hydrogen to reduce the oxide; others that the residue be treated with a few drops of formic acid and dried, for the same purpose. The latter method is not always effective and the former is open to the objection that the palladium sponge absorbs a considerable quantity of hydrogen which may be catalytically oxidised to water when the sponge is exposed to the air.

It has been reported by the United States Bureau of Standards, however, that the foregoing difficulties can be avoided by cooling the sponge, after ignition in air, in an atmosphere of carbon dioxide, rather than hydrogen. The oxide or oxides of palladium which may form during the ignition of compounds of the metal in air are completely dissociated at temperatures readily attainable in porcelain crucibles heated with ordinary laboratory burners. If the metal is finally heated briefly in an atmosphere of carbon dioxide and allowed to cool in this gas no oxide is formed and the residue can be weighed directly, as metal.

News from the Allied Industries

Paper

THE NEW PAPER MILLS established at Wigton by the British New-Wrap Co., Ltd., started production this week. The company will specialise in transparent wrapping paper.

Linoleum

IT IS UNDERSTOOD that Michael Nairn and Co., linoleum manufacturers, Kirkcaldy, have bought the Fife Linoleum Co.'s undertaking at Kirkcaldy for £75,000. A sum of £5,000 will be used as compensation to employees who have been placed on notice. The purchase of this factory is a definite step by Michael Nairn and Co. towards centralising the production of linoleum in Kirkcaldy. This was recently foreshadowed by a circular issued to the preference shareholders of Michael Nairn and Greenwich, Ltd., offering to buy their shares at 24s. each. The Greenwich factory is mainly concerned with the production of inlaid linoleums and employs nearly 1,000 hands. The share capital of the Fife Linoleum Co. is £100,000, of which £86,000 is paid up.

China Clay

MR. MAURICE PETHERICK, M.P., the member for the Penryn and Falmouth Division of Cornwall, of which the china clay district of St. Austell constitutes an important part, has just returned from a trade delegation to Sweden and Finland. Speaking at St. Austell at the opening of the new Conservative Club, he said he had had the opportunity of observing British Week in Finland, which was an enormous success, and the trade agreement which culminated would be of considerable advantage to the china clay industry. Mr. E. J. Hancock, sales manager for the firm of English Clays, Lovering, Pochin & Co., who was sent as a representative to the British Week celebrations in Finland, has also returned and was highly satisfied with the result, and the gratifying prospects of an increased demand for china clay. Mr. Hancock, who is a member of the executive of the British China Clay Producers' Federation, observed during his stay in Finland that that country was developing her natural resources very considerably, the chief of which are the production of timber and cheap electrical power. Wood pulp so extensively used in the manufacture of paper is being developed and better grades of paper which consume a larger quantity of china clay is the next stage in their progression.

Artificial Silk

FROM INFORMATION NOW GIVEN by the directors of the Branston Artificial Silk Co., it is clear that the raising of the sum required to discharge the comparatively small debt to the Alliance Assurance Co., which was secured only just in time to prevent the sale of the property and plant, was not an easy matter. A number of the shares of Kirklees, Ltd., held by the company had to be sold, while a small portion of the Branston property not required for the manufacture of artificial silk was also disposed of. The net proceeds of these sales, together with note subscriptions, were not sufficient to meet the debt, however, and the balance had to be provided by means of loans. The report of a technical expert upon the steps to be taken for the resumption of production is now awaited.

DETAILS OF A SCHEME OF ARRANGEMENT dealing with arrears of dividend on the 7 per cent. cumulative participating preferred shares of Canadian Celanese, Ltd., have been forwarded to shareholders. In addition to the fixed dividend, these shares are entitled to 10 per cent. of the remaining profits. No participating distribution has ever been made, however, while the fixed payments have fallen heavily in arrears, the total at the end of last year amounting to \$28.75 per share. The position to-day is slightly better, the regular dividend for the first half-year having been paid, in addition to \$1 per share on account of arrears. In satisfaction of the balance, holders of the preferred shares are offered a cash payment of \$1.62 and one-half of a common share of no par value in respect of each share.

Sugar

COMPLETE AGREEMENT HAS BEEN REACHED at Washington on the question of sugar stabilisation. President Roosevelt, or his nominee, is empowered to raise or lower Cuba's tentative sugar quota, and the amount of raw sugar which producers may supply to the domestic market is to be limited to about 7,000,000 tons annually.

Beet Sugar

OVER 250 GROWERS OF SUGAR BEET have this year contracted in all parts of Yorkshire with the Poppleton Sugar Factory, which is preparing for a record campaign, and will deal with at least 100,000 tons of sugar beet between now and the new year. If the crop comes up to expectations 120,000 tons will be turned into sugar, molasses and pulp. Although the rated capacity of the factory is 1,000 tons of beet per day, as much as 2,000 tons can be dealt with under the best conditions, and this year it is expected that a daily slicing average of 1,600 tons will be maintained.

Mineral Oil

THE BATA A.G. has started the construction of a mineral oil refinery in Batov, which is to produce various kinds of petrol and mineral oil for the use of the Bata boot and shoe works.

A BILL TO GIVE THE ARGENTINE GOVERNMENT control of petroleum production was passed by the Chamber at Buenos Aires, on September 25. This Bill provides that all petroleum wells shall be the property of the nation or provinces. It authorises the Government to limit or forbid the import or export of petroleum. Private individuals may explore for wells, and exploit them, but only in conformity with this law. Foreign States and foreign individuals not domiciled in Argentina may not, either directly or indirectly, buy rights in these wells. No concessionaire may have more than five licences in each department. The State is to receive 12 per cent. on the raw product of all petroleum exploitation.

Safety Glass

THE TRIPLEX SAFETY GLASS CO. will shortly extend its activities to branches of industry other than the manufacture of glass. This fact was revealed by Mr. Graham Cunningham, the managing director, in the course of his remarks to shareholders present at the annual meeting held in London on September 21. They still had, he said, a certain amount of surplus factory accommodation at King's Norton, and had for some time been looking round to see if there were any other businesses into which they could enter. At present they were closely investigating two or three possible developments—two of them being the result of research work by their chemists. Shareholders had also probably read that the company was now developing a new type of safety glass called "Triplex Toughened." That was not a laminated glass, but ordinary plate-glass specially treated, and it had qualities entirely different from Triplex as formerly known. It was a 100 per cent. British product both in material and labour. It was a particularly hard glass, quite incapable of discolouration or blistering; it would withstand very extreme temperatures, and when broken, it broke in a way entirely different from laminated Triplex.

ADVANTAGES over other types of wood preservative processes are claimed in the case of a new proprietary mixture containing arsenic and chromium salts. In contact with the wood it forms difficultly soluble compounds which remain unaffected by rain after many years, thus retaining their fungicidal and insecticidal action over long periods. According to the "Chemische Fabrik," July 19, 1933 (page 313), the high toxicity of the new product, its cheapness, ease of manufacture and non-inflammability are other points in its favour. Being highly toxic, however, the product is only suitable for expert application.

Smoke Nuisance Problems

National Smoke Abatement Society at Sheffield

DELEGATES representing local authorities from all parts of the country attended the fifth annual conference of the National Smoke Abatement Society, which opened at Sheffield last Saturday, September 23. They were welcomed by the Lord Mayor, Alderman Ernest Wilson, who said he would like their energies to be devoted more to householders than works in averting the smoke nuisance. Although he did not want to see more smoke in Sheffield, he said he would like to see more works chimneys smoking. Despite its factories and alleged smoke pall, Sheffield could be called a health resort, the reading of sunlight taken there comparing very favourably with those of seaside resorts.

Dr. H. A. des Voeux, President of the Society, said England was at last recognising the work which the Smoke Abatement Society had done. Twenty years ago he came to Sheffield to press manufacturers on the question of smoke, but no interest whatever was shown. They seemed to love it and glory in it. Congratulating the city on being the first place in this country to start a local Smoke Abatement Committee, he said it took a place like Sheffield to have the pluck to commence such a body. They were now teaching manufacturers what ought to have been taught them many years ago, instead of harassing them.

Attention was being turned, said Dr. des Voeux, to a new automatic filter which would indicate the direction of the wind, so that it could be seen from what direction the sus-

pended impurity came. Observations showed that pollution from Norwich was significant for an average distance down wind of five or six miles. It was deduced that in the case of an urban area of twenty-four miles diameter, as compared with the two miles diameter of Norwich City, the effect of pollution would be measurable for a distance of sixty or seventy miles. The destructive effect of sulphur gases on buildings had led to the development of another instrument, which passed a known volume of air through a solution of hyperol, the sulphur gases absorbed being determined daily. This instrument was already in use at ten observation station, and he hoped that in view of the importance of the sulphur question the tests would be instituted by many more local authorities.

The position of the iron and steel industry and other metallurgical trades in relation to the five years exemption clause contained in the Smoke Abatement Act of 1926 was discussed by Mr. W. Asbury, Chairman of the Sheffield Rotherham and District Smoke Abatement Committee. Could we leave the Act as it was, he asked, and trust manufacturers to reconstruct their furnaces on right lines? Unfortunately, we already had evidence of reconstruction work carried out where the furnaces had been rebuilt, new furnaces having been installed on the old uncontrolled method of smoke-making. They offended every law of combustion, and would never give satisfactory results.

Weekly Prices of British Chemical Products

Review of Current Market Conditions

EXCEPT for restrictions caused by exchange fluctuations, the market during the past week has on the whole been brighter and buyers are more confident. Among industrial chemicals the greatest activity continues to be found in acetone, anhydrous ammonia, formaldehyde and formic acid. Arsenic has not attracted much attention, and slackness was also noticeable in sodium sulphide and potassium salts. Ammonium chloride has been steady at a higher level, and the demand for acetic acid has slightly improved. The most active items in the coal tar products market were cresylic acid and creosote oil. In other directions moderately good business is reported, pitch continues rather weak, although a slight improvement has been shown. Owing to the slight fall in the value of sterling several pharmaceutical chemicals have experienced price alterations, and among those products to be marked up was quinine salts. Business generally has been fairly satisfactory, about the brightest item being aspirin. Other products in steady demand were benzoic acid, hexamine and sodium benzoate. Inquiries for paraformaldehyde have been more frequent, although there is considerable competition for large orders. In the essential oils section business has been moderately good. The increased price of lavender is considerable.

The prices of all chemical products remain the same as last week with the exceptions quoted below.

LONDON.—Prices remain generally firm with a good steady demand. The demand for coal tar products remains good. The market is firm and prices show a tendency to rise.

MANCHESTER.—The process of improvement in the demand for chemicals on the Manchester market continues to be a slow one, although, on the whole, the current month's business has, in the aggregate, been of better proportions than most sellers experienced in August. Quotations are occasionally being shaded a little bit, on the whole, the tendency remains distinctly steady. A moderate hand-to-mouth business has been put through this week in the leading alkali products and fair quantities are being taken against contracts, but users are not committing themselves at all freely so far as new forward bookings are concerned. The demand for the potash compounds has been on rather quiet lines, with a moderate trade passing in the acid section. In several departments of the by-products market, activity this week has been fair. A little more inquiry has been reported in respect of pitch, and a steady demand is passing in the case of creosote oil and certain of the lighter products. Supplies of carbolic acid are being absorbed fairly readily, but the aggregate demand for cry-

stals, due to a falling off in export interest, has been rather smaller than it was a short time ago.

SCOTLAND.—Business generally in the Scottish heavy chemical market is steady, although there is little spot business being done at the present time.

General Chemicals

ACID, OXALIC.—LONDON: £47 7s. 6d. to £57 10s. per ton, according to packages and position. SCOTLAND: 98/100%, £49 to £52 ex store. MANCHESTER: £48 to £53 ex store.

ACID, TARTARIC.—LONDON: 11d. per lb. SCOTLAND: B.P. crystals, 11d., carriage paid. MANCHESTER: 11½d. to 1s.

LEAD, ACETATE.—LONDON: White, £35 per ton; brown, £1 per ton less. SCOTLAND: White crystals, £33 to £35; brown, £1 per ton less. MANCHESTER: White, £31 10s.; brown, £30.

POTASH, CAUSTIC.—LONDON: £42; MANCHESTER: £40 to £41.

POTASSIUM CHLORATE.—LONDON: £37 to £40 per ton. SCOTLAND: 99½/100% powder, £37. MANCHESTER: £38.

SULPHATE OF COPPER.—MANCHESTER: £16 to £16 10s. per ton f.o.b.

Pharmaceutical and Fine Chemicals

IRON QUININE CITRATE B.P.—10½d. to 11½d. per oz.

QUININE SULPHATE.—2s. per oz.

SODIUM BARBITONUM.—13s. to 15s. per lb.

SODIUM BENZOATE, B.P.—1s. 9d. to 2s. 3d. per lb.

ZINC STEARATE.—1s. 3d. to 1s. 8d. per lb.

Essential Oils

BOURBON GERANIUM.—24s. 3d. per lb.

CITRONELLA, JAVA.—2s. 4d. per lb.

LAVENDER, MONT BLANC, 38/40%.—16s. per lb.

Coal Tar Products

PITCH.—Medium soft, £3 15s. to £4 per ton. MANCHESTER: £3 15s. to £4 f.o.b. LONDON: £3 15s. f.o.b. East Coast port for next season's shipment.

Nitrogen Fertilisers

SULPHATE OF AMMONIA.—Home, £6 15s. per ton delivered in 6-ton lots to farmer's nearest station; export, £6 8s. 9d. f.o.b. U.K. ports in single bags.

CYANAMIDE.—£7 per ton, carriage paid to any railway station in Great Britain in lots of 4 tons and over.

NITRATE OF SODA.—£7 8s. 6d. per ton delivered in 6-ton lots to farmer's nearest station.

NITRO-CHALK.—£7 5s. per ton delivered in 6-ton lots to farmer's nearest station.

Inventions in the Chemical Industry

Specifications Accepted and Applications for Patents

THE following information is prepared from the Official Patents Journal. Printed copies of Specifications accepted may be obtained from the Patent Office, 25 Southampton Buildings, London, W.C.2, at 1s. each. The numbers given under "Applications for Patents" are for reference in all correspondence up to the acceptance of the Complete Specification.

Specifications Accepted with Dates of Application

APPARATUS FOR AERATING LIQUIDS.—Bell Bros. (Manchester 1927,) Ltd., and C. G. Benson. Dec. 7, 1931. 398,521.

APPARATUS FOR MIXING GASES WITH LIQUIDS.—Bell Bros. (Manchester 1927,) Ltd., C. G. Benson and A. M. Mitchell. Dec. 7, 1931. 398,491.

PRODUCTION OF HIGHLY POLYMERISED ALIPHATIC ALCOHOLS.—K. Noack. Feb. 6, 1932. 398,474.

MANUFACTURE OF ESTERS.—E. H. Strange and T. Kane. March 8, 1932. 398,527.

MANUFACTURE OF METHYLAMINE.—H. Dreyfus. March 9, 1932. 398,502.

PROCESS FOR THE MANUFACTURE OF METHYLAMINE.—H. Dreyfus. March 9, 1932. 398,503.

PRODUCTION OF METHYLAMINE.—H. Dreyfus. March 9, 1932. 398,504.

MANUFACTURE OF PRODUCTS CONTAINING NITROGEN.—I. G. Farbenindustrie and A. Carpmael. March 14, 1932. 398,510.

MANUFACTURE OF AZO DYESTUFFS AND INTERMEDIATE PRODUCTS.—A. Carpmael (I. G. Farbenindustrie). March 15, 1932. 398,516.

MANUFACTURE OF ADSORPTIVE OR CATALYTIC GELS.—Silica Gel Corporation. March 18, 1931. 398,517.

PROCESS OF MANUFACTURING β PHENYL ETHYL ALCOHOL.—P. Schorigin, V. I. Isaguljan, A. R. Guessewa, K. S. Paliakoff, and V. P. Ossipowa. March 21, 1932. 398,561.

TREATMENT OF HYDROCARBON OIL.—Universal Oil Products Co. April 7, 1931. 398,566.

DISTILLATION OF READILY-VOLATILISABLE METALS.—F. Krupp Grusonwerk Akt.-Ges. Feb. 12, 1932. 398,573.

PRODUCTION OF MOULDED LAMINATED PAPER PRODUCTS.—British Thomson-Houston Co., Ltd. June 23, 1931. 398,618.

TREATMENT OF MIXED ORGANIC ESTERS OF CELLULOSE.—Kodak, Ltd. July 17, 1931. 398,626.

MANUFACTURE OF TERTIARY ORGANIC PHOSPHATES.—W. W. Groves (Chemische Fabrik von Heyden Akt.-Ges.). Oct. 21, 1932. 398,659.

PROCESS FOR PRODUCING WOOD CELLULOSE COMPARABLE TO COTTON, WITH HIGH CONTENT OF ALKALI RESISTING CELLULOSE.—F. C. Palazzo and F. Palazzo. Dec. 24, 1932. 398,730.

PRODUCTION OF SODIUM CYANIDE.—Ges. für Kohlentechnik. Feb. 26, 1932. 398,732.

MAGNESIUM BASE ALLOYS.—W. J. Tennant (Dow Chemical Co.). April 8, 1933. 398,760.

Complete Specifications Open to Public Inspection

METHOD OF, AND APPARATUS FOR, SEPARATING WAX FROM OIL.—Standard Oil Co. March 18, 1932. 5567/33.

WATER-SOLUBLE DYESTUFFS OF THE ANTHRAQUINONE SERIES AND PROCESS FOR THE MANUFACTURE THEREOF.—Chemische Fabrik Vorm. Sandoz. March 12, 1932. 7465/33.

PROCESS FOR DELUSTERING NATURAL AND ARTIFICIAL SILKS.—Chemische Fabrik Vorm. Sandoz. March 12, 1932. 7466-7/33.

MANUFACTURE OF THERMOPLASTIC MATERIALS.—Celluloid Corporation. March 12, 1932. 7532/33.

MANUFACTURE OF MUSCLE ADENYLIC ACID.—I. G. Farbenindustrie. March 12, 1932. 7621/33.

PROCESS FOR MAKING RESINOUS CONDENSATION PRODUCTS.—Dr. A. Pitzer. March 12, 1932. 7643/33.

MANUFACTURE OF 1,4-DIAMINO-2-ARYLOXYANTHRAQUINONE-3-SULPHONIC ACIDS.—I. G. Farbenindustrie. March 15, 1932. 7748/33.

PROCESSES FOR OBTAINING ANHYDROUS ETHYL AND METHYL ALCOHOL FROM CRUDE SPIRIT, AND APPARATUS THEREFOR.—Reichsmonopolverwaltung für Brauntwein. March 15, 1932. 7875/33.

MANUFACTURE OF NAPHTHOYL BENZOIC ACID DERIVATIVES.—E. I. Du Pont de Nemours and Co. March 16, 1932. 8021-2/33.

PROCESS FOR OBTAINING ALKALINE HYDRATES FROM SILICATES.—F. Jourdan. March 18, 1932. 8365/33.

PROCESS FOR THE TREATMENT OF SILICATES WITH ACIDS IN ORDER TO OBTAIN THEIR SOLUBLE SALTS.—F. Jourdan. March 18, 1932. 8366/33.

MANUFACTURE OF DYES AND INTERMEDIATES THEREFOR, AND SENSITISATION OF PHOTOGRAPHIC EMULSIONS THEREWITH.—I. G. Farbenindustrie. March 18, 1932. 8381/33.

MANUFACTURE AND USE OF SUBSTANCES SUITABLE FOR USE AS WETTING-OUT, WASHING, CLEANSING, PROTHING, AND DISPERSING AGENTS.—Deutsche Hydrierwerke Akt.-Ges. March 18, 1932. 8395/33.

Applications for Patents

PRODUCTION OF ALUMINIUM FLUORIDE.—E. J. Bloore, British Aluminium Co., Ltd., S. F. Derbyshire and W. E. Sims. Sept. 20. 26021, 26022.

STABILISING PEROXIDE SOLUTIONS.—H. T. Böhme A.-G. Sept. 18. (Germany, Sept. 27, '32.) 25813.

RETORTS FOR DISTILLATION OF MATERIALS CONTAINING HYDROCARBONS.—E. W. Brocklebank. Sept. 23. 26299.

PRODUCTION OF COPPER SALTS.—E. I. Du Pont de Nemours and Co. Sept. 19. (United States, Sept. 19, '32.) 25925.

MANUFACTURE OF THIOINDIGO DYESTUFFS.—E. I. Du Pont de Nemours and Co. Sept. 22. (United States, Sept. 22, '32.) 26246.

MANUFACTURE OF POWDERED VEGETABLE GLUES.—H. Gouthière et Cie. Sept. 22. (France, Sept. 27, '32.) 26244.

MANUFACTURE OF ALKALI ALCOHOLATES.—I. G. Farbenindustrie. Sept. 18. (Germany, Sept. 27, '32.) 25775.

MANUFACTURE OF AZO DYESTUFFS INSOLUBLE IN WATER.—I. G. Farbenindustrie. Sept. 22. (Germany, Sept. 24, '32.) 26203.

MANUFACTURE OF AZO DYESTUFFS.—I. G. Farbenindustrie. Sept. 23. (Germany, Sept. 23, '32.) 26299.

LIME BURNING, ETC.—Imperial Chemical Industries, Ltd. Sept. 19. 25885.

MANUFACTURE OF AMINES.—J. Y. Johnson (I. G. Farbenindustrie). Sept. 18. 25779.

MANUFACTURE OF SULPHURIC ACID.—P. S. Lewis, National Processes, Ltd., and S. Robson. Sept. 18. 25767.

TREATING EXIT GASES OF CONTACT SULPHURIC ACID PLANT.—P. S. Lewis, National Processes, Ltd., and S. Robson. Sept. 18. 25768.

TREATMENT OF UNSATURATED ORGANIC HALOGENATED COMPOUNDS. N. V. De Bataafsche Petroleum Maatschappij. Sept. 22. (United States, Oct. 4, '32.) 26220.

PRODUCTION OF TRANSPARENT, ETC., COATINGS ON SHEETS, ETC., OF REGENERATED CELLULOSE.—Soc. Industrielle de la Cellulose. Sept. 20. (Germany, Sept. 26, '32.) 26006.

MANUFACTURE OF DYESTUFFS.—Soc. of Chemical Industry in Basle. Sept. 20. (Switzerland, Sept. 20, '32.) 25978.

MANUFACTURE OF DYESTUFFS.—Soc. of Chemical Industry in Basle. Sept. 20. (Switzerland, April 8.) 25979.

MANUFACTURE OF BARBITURIC ACIDS.—Dr. A. Wacker Ges für Elektrochemische Industrie Ges. Sept. 18. (Germany, Sept. 21, '32.) 25776.

Forthcoming Events

Oct. 3.—Hull Chemical and Engineering Society. "Paint in Art and Industry." L. A. Jordan. 7.45 p.m. Hull Photographic Society's Room, Grey Street, Park Street, Hull.

Oct. 3.—Staffordshire Iron and Steel Institute. Presidential Address, Harold E. Cookson. 7 p.m. James Watt Memorial Institute, Great Charles Street, Birmingham.

Oct. 4.—Society of Public Analysts. "The Occurrence and Origin of Lead in Canned Sardines." L. H. Lampitt. "The Chemical Examination of Furs in relation to Dermatitis." H. E. Cox. "The Investigation of Japanese Beeswax." H. Ikuta. 8 p.m. Burlington House, Piccadilly, London.

Oct. 4 to 14.—Ninth International Exhibition of Inventions, organised by the Institute of Patentees. Central Hall, Westminster.

Oct. 5.—Midland Metallurgical Societies. "The X-Ray Analysis of Metals." V. E. Pullin. 7 p.m. James Watt Memorial Institute, Great Charles Street, Birmingham.

Oct. 6.—Institution of Chemical Engineers. "The Sedimentation of Fine Particles in Liquids." R. F. Stewart and E. J. Roberts. 6 p.m. Burlington House, Piccadilly, London.

Oct. 6.—The Sir John Cass Technical Institute. Inaugural Ceremony Session 1933-34. Address by Sir Robert A. Johnson. 8.15 p.m. Jewry Street, Aldgate, London.

Oct. 9.—The Ceramic Society. Spode Bi-Centenary meeting. "Josiah Spode—His Times and Triumphs." J. Thomas. 7.30 p.m. North Staffordshire Technical College, Stoke-on-Trent.

Oct. 9.—Society of Chemical Industry (London Section). "Tung Oil. Chemical Studies and Specifications." Dr. L. A. Jordan. "Application of Fumigants to Ships." Dr. A. B. Page. 8 p.m. Burlington House, London.

From Week to Week

DR. J. J. E. VAN DEN BRANDELER has been appointed a director of the British Enka Artificial Silk Co., Ltd., in place of Dr. F. Bluthgen, resigned.

MR. S. W. GOODMAN has been appointed managing director of the Molassine Co., in place of Mr. John Prosser, who has resigned. He will, however, retain his seat on the board and continue to act as chairman.

THE SULPHIDE CORPORATION, LTD., is extending its zinc oxide plant at Seaton Carew works. This has become necessary on account of the increased demand for "Spartic" brand zinc oxide, both in this country and numerous foreign countries.

PROFESSOR EHRENFEST, of Leyden University, committed suicide by shooting himself last Monday in an Amsterdam clinic. He first attempted to kill his son, but only succeeded in wounding him. He was a famous German physicist and personal friend of Einstein.

NOTICE WAS GIVEN in the "London Gazette" on September 22 that the Monroe Chemical Co., Ltd., at an extraordinary general meeting on September 19, decided that the company be wound up voluntarily. Mr. J. H. Piper, of 82 Tynley Road, Forest Gate, E.7, was appointed liquidator.

REPRESENTATIVES OF THIRTY-FIVE FIRMS in the chemical engineering equipment industry of the United States, met at the call of H. D. Miles, president of the Buffalo Foundry and Machine Co., at the Chemists' Club, New York, on August 28, and formed a Chemical Engineering Equipment Institute to assist this industry in taking advantage of the provisions of the National Industrial Recovery Act.

THE DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH is carrying out experiments at East Malling, Kent, on the preservation of apples during ocean transport. An experimental hold with a capacity of 16,000 cu. ft. has been erected, in which temperatures are being recorded, bad air analysed, and other storage problems investigated. Refrigeration, either by means of brine pipes or air circulation can be employed. All apples are inspected before being placed in the hold.

THE INAUGURAL CEREMONY of the 1933-34 session of the Sir John Cass Technical Institute will take place on October 6, at 8.15 p.m. Sir Robert Johnston will give an address. The syllabus of classes has already been published. The Institute has also put out a booklet entitled "Modern Metallurgy," which has been sent to firms in Greater London, and gives an idea of the up-to-date character of the equipment used for the metallurgical courses. Copies can be obtained from the Principal, Jewry Street, E.C.3.

AS THE RESULT OF THREATENED STRIKE ACTION by the Perth branch of the Amalgamated Society of Dyers, all non-union members in the works of J. Pullar and Sons, Perth, have joined the society. Until two years ago Pullar's was 100 per cent. organised and an unwritten condition of employment was membership of the society. Recently, however, non-union members have been employed and the society have taken action against all those who are in arrears of payment. After a branch meeting it was decided to take strike action, but only in the dye-house, where there was a two-hour stoppage, was this necessary.

PRINCE GEORGE, who was visiting North Wales, on Tuesday declared open the new electric power station of the Monsanto Chemical Works at Acrefair, which have cost £70,000. The new plant is part of the company's scheme for reducing manufacturing costs and allowing for future expansion. The designer, Mr. C. J. Colley, has estimated a total return of the investment within five years. He claims that the type of equipment used, in which the steam generates the electricity and is also utilised for plant processes, is unique in the chemical industry of this country on such a large scale. The works were founded sixty-six years ago to produce oil and wax, and the manufacture of fine chemicals was only started after the war. During the whole period of its existence the Monsanto Co. has never had to deal with a strike.

OFFICIAL DETAILS of Argentina's tariff concessions to the United Kingdom, under the supplementary agreement signed at Buenos Aires on Tuesday, have now been issued. The concessions include reduced tariffs on cotton and wool textiles, artificial silk goods and linen goods. There are smaller concessions in regard to metals, machinery and vehicles and reductions in the tariffs on chemicals, paints and varnishes, pottery and glass, foods and beverages and other goods. Substantial reductions of the Customs duties have been conceded in respect of various soda compounds, white and red lead, copper sulphate, ultramarine blue, fruit salts, metal polishes, gunpowder and dynamite; also in respect of such products for the medicinal treatment of livestock as are dutiable. Duty-free admission of sheep-dip (an important trade) has been conventionalised. The tariff classification of paints and varnishes has been revised and technically improved, and reduction of duties, of varying amounts, have been conceded in respect of most classes of these goods.

MR. HAROLD CREAN, a member of the paint manufacturing firm of James Crean and Sons, Ltd., Dublin, has been elected a member of the Council of the Federation of Irish Industries.

AMONG LATEST WILLS PROVED is that of Mr. Shirley Aldred, Blackpool, of Shirley Aldred and Co., Ltd., who left £17,910 (net personalty £6,056).

THE HOME SECRETARY has made a regulation reducing the medical fee for periodic examinations under the Workmen's Compensation (Silicosis and Asbestosis) Act from 26s. to 22s. as from September 1.

THE ALUMINIUM ERZBERGWERK U. INDUSTRIE, A.-G., Budapest, which belongs to the Bauxite Trust A.-G., Zürich, is establishing an argillaceous earth and aluminium factory. Simultaneously, the Manfred Weiss Steel A.-G., Budapest, has applied for government subsidies for building an aluminium works.

THE ANGLO-AMERICAN OIL CO., LTD., has appointed Mr. William E. Jenkins as secretary in succession to Mr. R. A. Carder, who was recently appointed a director. Mr. Jenkins joined the company immediately after the war, and has filled several important positions, including those of chief accountant and assistant secretary.

THE REPORT OF THE DIRECTORS of Motor Fuel Proprietary, Ltd., states that arrangements are being made for Mr. H. P. Stephenson, late assistant engineer to I.C.I., to join the company as technical advisor. He will take charge of the plants and laboratory at Slough. Mr. Stephenson has had long experience of the low temperature carbonisation of coal, and is joint inventor with I.C.I. of several of their hydrogenation patents.

THE RUSSIAN PETROL EXPORT ORGANISATION "Sojusneftexport," is, according to rumours which have reached Berlin, concentrating on the market in Northern China. The Ta Hwa Petrol Co., Tientsin, has further reduced its prices against Anglo-American competition. This concern is in charge of the distribution of Russian crude oil and petrol, and through its Russian interests has received large orders for crude oil in all parts of China.

REPRESENTATIVES of the Allied Association of Bleachers, Printers, Dyers and Finishers again met at Manchester on September 25 to discuss the establishment of a minimum wage. After the meeting it was officially stated that "the employers' representatives intimated their inability, on the ground of the condition of the industry and the impossibility of meeting any increased cost of production, to accede to the application of the unions for an increase in wages."

MR. WILLIAM BOTTOMLEY, aged 57, of Hemp Gill, Frodsham, was found dead on the railway line near Speke, Cheshire, on September 14, having fallen out of a train. He was for many years chief engineer at Widnes for Imperial Chemical Industries, Ltd., and retired about 18 months ago. He was very well known on Merseyside. At the inquest the jury, at the coroner's suggestion, returned an open verdict. The funeral took place on September 19 at Allerton Cemetery.

THE UNIVERSITY OF BOMBAY has secured the services of Dr. R. B. Foster, of Leeds University, as head of the Department of Chemical Technology, which has been recently constituted. Dr. Forster has been lecturer in colour chemistry at Leeds for 14 years, and founded the local section of the Institute of Chemistry. He stated that one of the reasons why the University of Bombay had founded the department was "to enable India to supply her own needs so far as dyes and the dyeing industry are concerned." Mr. E. J. Cross, who was assistant lecturer in dyeing, will fill the vacancy at Leeds.

AT THE STATUTORY MEETING of the creditors of the Lancashire Asbestos Co., Ltd., of Hurst Mills, Ashton-under-Lyne, Mr. J. W. Kenworthy, one of the directors, presided and reported that resolutions had been passed for voluntary liquidation. The statement of affairs showed ranking liabilities of £24,229, all due to unsecured creditors. The assets, after allowing £406 for preferential claims, amounted to £5,003. The company was registered about two years ago, with a nominal capital of £30,000, of which £15,000 was issued, partly for cash, and the remainder for a consideration other than cash. Debentures had been issued to Mr. J. W. Kenworthy, who appointed Mr. L. Shaw to act as receiver on July 20 last. It was stated that the company was promoted to carry out certain preparations for the manufacture of asbestos and that venture had proved unsuccessful. The loss from the commencement of the company to date was approximately £10,000. The debenture holder did not want to take any preference under his debentures, and had agreed to rank as an ordinary unsecured creditor. A resolution was unanimously passed confirming the voluntary liquidation of the company with Mr. Shaw as liquidator.

Company News

Cooper, McDougall and Robertson, Ltd.—It is announced that consideration of the payment of a dividend on the ordinary shares has been deferred until the accounts are available.

Boots Pure Drug Co., Ltd.—The usual quarterly interim dividend has been declared on the ordinary shares, at the rate of 2½ per cent. per annum, less tax, payable in October.

Thos. W. Ward, Ltd.—A net profit of £106 is announced for the year to June 30 last, making with the amount brought forward a credit balance of £18,394, which is to be carried forward.

Phosferine Products Co.—The accounts for the year ended June 30 last, state that the year's trading has resulted in a debit balance of £238, compared with a loss of £293 in the previous year. This has been added to the balance at June 30, 1932, making £2,788 to be carried forward.

Canadian Celanese, Ltd.—A special general meeting of shareholders has been called for October 31, in Montreal, for the purpose of discussing a scheme providing for the liquidation of preferred dividend arrears, details of which are given in a circular issued to holders of the 7 per cent. cumulative participating preferred shares and common shares of no par value.

Seager, Evans & Co.—The report for the year ended March 31, 1933, states that trading has resulted in a profit of £1,505, compared with a loss of £5,171 in 1931-32. Depreciation takes £944 and leaseholds depreciation £84. The profit and loss account now shows a debit of £32,988. The annual meeting will be held at Southern House, Cannon Street, London, on October 6, at 11 a.m.

Sheepbridge Coal and Iron Co.—The gross profits for the year to June 30 last amount to £148,381, after tax, depreciation, etc., comparing with £140,125 a year ago. The net profit is £88,228, against £82,691, and the directors recommend a final ordinary dividend of 3½ per cent., again making 5 per cent. for the year. Reserve receives £20,000 as in the preceding year, while the carry-forward is up from £83,025 to £84,327.

Fabrique de Soie Artificielle de Tomaszow, S.A.—An extraordinary general meeting of shareholders is to be held in Warsaw on October 18, to decide upon the reduction of the share capital by cancellation of 200,000 shares of a nominal value of Z1.30 each, so that the reduced capital will amount to Z1.29,700,000. It is stated that the exchange of four of the present shares of Z1.30 into one share of Z1.120, is to take place not later than December 31, 1936.

Motor Fuel Proprietary, Ltd.—The report for the period of fourteen months to July 31, 1933, states that under powers conferred on them by the Articles of Association, the directors have raised the sum of £8,400 by the issue of 1,680 five-year notes of £5 each. It is stated that this money will enable the company to pay off the mortgage and other liabilities and to resume its activities, and secure the commercial development of the company's process. The shareholders will be asked to confirm the directors' action at the annual meeting of the company on October 4, at 24 St. Mary Axe, London, at 2.30 p.m.

Chemical Trade Inquiries

The following trade inquiries are abstracted from the "Board of Trade Journal." Names and addresses may be obtained from the Department of Overseas Trade (Development and Intelligence), 35 Old Queen Street, London, S.W.1 (quote reference number).

Australia.—A well-connected manufacturers' agent in Sydney desires to obtain the representation of United Kingdom manufacturers of aniline dyes, etc., presumably for the whole of the Commonwealth. (Ref. No. 334.)

Australia.—An Australian business man at present in London desires contact with owners of proprietary chemical lines suitable for manufacture in Australia with a view to arranging purchase. Letters should be addressed in the first instance to: C/o Australia House, Strand, W.C.2. (Ref. 412-7-1-1-700.)

Belgium.—A representative, who is also a qualified engineer, established at Brussels wishes to obtain the exclusive representation, on a commission basis, of United Kingdom manufacturers of castings, ferro-alloys, silica refractory products, special steel for tools and constructional engineering, special apparatus suitable for constructional work. (Ref. No. 349.)

Hungary.—A wholesale druggist established at Budapest wishes to obtain the representation, on a commission basis, of United Kingdom manufacturers of drugs, chemicals, pharmaceutical preparations and patent medicines. (Ref. No. 361.)

India, Burma and Ceylon.—An old-established manufacturers' representative, with connection in India, who is at present in London, is desirous of securing the representation of United Kingdom manufacturers of patent foods and medicines (tonic foods), jam, etc., for India, Burma and Ceylon. (Ref. No. 342.)

Norway.—An agent established at Bergen wishes to obtain the representation on a commission basis, of United Kingdom suppliers of raw materials for tanneries, soap and chemical factories; or may also accept purchasing basis. (Ref. No. 363.)

Uruguay.—H.M. Consul at Montevideo reports that the State Electricity and Telephone Works is calling for tenders, to be presented in Montevideo by November 6, 1933, for the supply of 288,000 kilograms, of lubricating oils. (Ref. B.Y. 7666.)

British Drug Houses, Ltd., have just issued the third edition of their booklet, "PH Values." It will be remembered that an article based on the second edition appeared in THE CHEMICAL AGE of October 8, 1932. We have also received from the same source a new catalogue of indicators and various accessories used in the determination of hydrogen ion concentration. The importance to the chemist of reliable indicators for this purpose cannot be stressed too often, and equally essential in every branch of chemistry is a knowledge of the pH value of liquids. These two booklets will be supplied to any bona fide chemist who applies for them to the head office of B.D.H., Graham Street, City Road, London, N.1.

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